# The Influence of Innovation Strategy Diffusion on the UAE Public Sector Initiatives Outcomes

# تأثير إستراتيجية الإبتكار على مبادرات القطاع العام بدولة الإمارات العربية المتحدة

**by**

**MOHAMED ABDULRAHMAN ALI AL MARZOOQI**

**A thesis submitted in fulfilment**

**of the requirements for the degree of**

**DOCTOR OF PHILOSOPHY IN PROJECT MANAGEMENT**

**at**

**The British University in Dubai**

**December 2018**

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| Name<br>Designation | Name<br>Designation |

Date: ____________

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# ABSTRACTS

Innovation in the public sector has been a challenging task given that private sectors across the United Arab Emirates prove more competitive. The current statistics show that the scale and nature of challenges in public-oriented businesses need a government response that goes beyond incremental improvements to enforce the real changes. Among the project models that foster best outcomes include the project, programs, portfolio, strategy, and government councils. Studies done on public sectors reviews the knowledge needed to foster a rational connection between the social and economic outcomes, the diffusion sense of innovation and the public-oriented business goals.

The study aims at establishing key approaches to innovation diffusion in the public-oriented business entities. The business models including the project, programs, portfolio, and government councils have a direct impact on targeted changes from innovation integration. However, the study performed an in-depth review of public sector innovation models contributing towards a successful innovation diffusion across the sector.

The research relies on the previous similar studies developed on the basis of innovation in the public to build a strong foundation for the study. The reviewed articles and selected for this study will not have a specified limitation in terms of chronological concept to create a wide informed source of information.

Quantitative method of closed questionnaires across the identified business models was used to assess the innovation diffusion and enhance meeting of the study purpose. The selection of participants from the public-oriented institutions ensured the researcher meets the objectives for which the study is conducted. Employees in federal and local entities in the UAE were selected as respondents.

Descriptive analysis of collected data used to measure variability and skewness of factors that affect innovation diffusion in a public sector. Corrleation and regression analyses conducted to explore the association between study main constructs (innovation practices, innovation skills, potential innovation outcomes). Besides, the research further investigated the mediator role by innovation skills concerning the association between innovation practices and outcomes. The results of the study successfully confirmed the mediation role of the innovation model.

Integrating innovation diffusion across the public sector has a vital contribution to the social and economic success in UAE. The key strategies to enhance diffusion in the public sector will continually make the state-owned enterprise more competitive and in position to offer quality goods.

**Keywords:** Innovation, public sector, project models, innovation diffusion, public-oriented business/entities

# ABSTRACTS IN ARABIC


تعزز هذه الدراسة المعرفة العملية والأكاديمية للابتكار في القطاع العام. وعلى غرار القطاعات الأخرى، فإن القطاع العام يركز على دمج ثقافة الابتكار لدى الشرائح المستهدفة لتحقيق الأهداف الوطنية وإثبات قدرتها التنافسية. تُظهر الإحصائيات الحالية أن نطاق التحديات وطبيعتها في المؤسسات ذات التوجه العام تحتاج إلى استجابة حكومية تتجاوز عمليات التحسين الروتينية بهدف تنفيذ تغييرات جذرية. من بين نماذج المشاريع التي تعزز أفضل النتائج تشمل مستويات عدة منها: المشروع والبرامج والمحافظ والاستراتيجية والمجالس الحكومية. وفيما يتعلق بالابتكار الحكومي، فإن الدراسات التي أجريت على القطاعات العامة تستعرض المعرفة اللازمة لتعزيز علاقة منطقية بين النتائج الاجتماعية والاقتصادية من خلال نشر الابتكار لتحقيق أهداف الأعمال الموجهة نحو الجمهور.

تهدف هذه الدراسة إلى إيجاد علاقة رئيسية بين الابتكار وتأثيره على نتائج القطاعات العامة الموجهة نحو الجمهور. كما إن نماذج الأعمال بما في ذلك نموذج عمل المشاريع الحكومية لها تأثير مباشر على النتائج المستهدفة. اعتمدت هذه الدراسة على مراجعة متعمقة لنماذج تفعيل الإبتكار في القطاع الحكومي بهدف المساهمة في نشر ثقافة الابتكار ونجاحه في جميع أنحاء القطاع العام. كما اعتمد البحث على دراسات مماثلة سابقة وضعت على أساس الابتكار الموجه للجمهور وذلك لبناء أساس قوي لهذه الدراسة. حيث تم استخدام الطريقة الكمية لعقد الدراسة الميدانية وتم جمع البيانات عبر الاستبيانات المغلقة. كما أنه تم اختيار المشاركين في الاستبيانات موظفين من مختلف المستويات الوظيفية من المؤسسات والهيئات الاتحادية والمحلية ذات التوجه العام في حكومة دولة الإمارات العربية المتحدة.

استخدم الباحث عدة آليات لتحليل البيانات منها التحليل الوصفي لقياس التباين والانحراف للعوامل التي تؤثر على نشر الابتكار في القطاع العام. كما أجرى الباحث تحليل العلاقة وقوة الارتباط بين تلك العوامل لاستكشاف مدى الترابط بين المتغيرات الرئيسية للدراسة وهي: ممارسات الابتكار، ومهارات الابتكار، ونتائج الابتكار المحتملة على القطاع العام. بالإضافة إلى ذلك، قام الباحث بتحليل دور المتغير الوسيط من خلال دراسة تأثير مهارات الابتكار على العلاقة بين ممارسات الابتكار والنتائج المحتملة. وأكدت نتائج الدراسة نجاح دور المتغير الوسيد في نموذج الابتكار الحكومي.

إن تكامل عملية نشر الابتكار في القطاع العام له مساهمة حيوية في النجاح الاقتصادي والإجتماعي في دولة الإمارات العربية المتحدة. وستساهم استراتيجيات الابتكار في تعزيز انتشار المشاريع الابتكارية في القطاع العام باستمرار وتجعل من الجهات المملوكة للدولة أكثر قدرة على المنافسة بما يمكنها من تقديم خدمات عامة عالية الجودة.

# DEDICATION

*I am dedicating this thesis as an outstanding success of my PhD degree to:*

*My parents for their kindness and devotion,*

*My family who have been a constant source of support, encouragement during the study period and their selflessness will always be remembered,*

*I also dedicate this thesis to all other members who helped to make this research possible.*

ACKNOWLEDGEMENTS

*This thesis was completed with the grace of god who gave me the knowledge and wit to develop this research paper. Synthesize*

*Foremost, I would like to gratefully acknowledge my thesis supervisor Professor Halim Boussabaine who patiently taught and guided me on how to go through the writing process step by step with his immense knowledge leading to synthesize all the thesis chapters.*

*I appreciate your efforts and I am so honored to have you as my research supervisor that eventually flourished my path to achieve my aspired goal.*

*Last but not the least, I would like to express my sincere gratitude to my family for supporting me spiritually throughout my life.*

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# 1. CHAPTER ONE: INTRODUCTION

## 1.1. Introduction

The chapter introduces the general background of the research topic, discusses the rationale of the research, and identifies the research problem and questions. Besides, it defines the research aim, objectives, and research hypotheses. The chapter concludes with a description of the significance of the research and presentation of a thesis outline.

## 1.2. Background to the research

Governments around the world struggle to eliminate policy deadlocks and legislate much-needed reforms in organizational structure and public services; as argued by (Jacob 2016). Hence, Jacob (2016) in his book explores collaborative innovation as a way for the public sector to break the impasse. Basically, in today's volatile and demanding competitive environment, it might be challenging for organizational adaptability and gaining survival in the emerging of innovation practices. However, new models of novelty are emerging in the business industry in which "rapidly replacing traditional corporate research labs as the sole source of new ideas, new technologies, and practices" (Atreyi et al. 2017, p. 84). Therefore, the concept of innovation has been evolved as an increasingly recognized phenomenon. Serious research studies undertook the vital role of this phenomenon on social and economic competitiveness (Jan, Ben and Esben 2013). As a result, innovation has risen as part of any dramatic business evolvement and the main driving force of growth. This places a high demand on the establishment of a clear connection between innovation and strategy to create public impact.

On the other hand, the role of strategy in organizational performance has profound on enhancing the success of the entire entity (David 2015). It has been envisioned by numerous researchers and business practitioners as the prime tool of achieving competitive advantage through improved organizational performance for-profit and non-profit ventures (John et al. 2014). While, a corporate strategy encompasses a considerable number of components ranging from harnessing opposites and contradictions into coherence, managing vision, and execution, combining external relationships and internal operations, and considering economic constraints together with a social purpose of the organization's existence (Wilson 2003). While alignment of corporate strategies with project portfolios often result in lower risk of business failure and increase the adaptability of the organization performance. Consequently, being successful requires having a dynamic, realistic, responsive, and strategically aligned projects and portfolio that leads an organization to aspire and achieve the desired goal (Nicasio et al. 2016). The emphasis ensures that the organizational performance is determined by the comprehensiveness of corporate strategy.

The comprehension of public sector projects necessitates the explanation of projects, portfolios, and programs in the public domain. Program infers to the coordination of group projects or subprograms to attain benefits unattainable from the projects on an individual basis (Meskendahl, 2010). For instance, the institutions of a rail network in a city might have failed in attaining the optimal set objectives. Similarly, a project involving the development of a viable communication infrastructure might fail to register a significant change. Therefore, a program will entail the coordination of the rail and the communication network to attain substantial steps towards the attainment of their objectives regarding public service. A project consists of a definite start and end point with unique goals and a timeline; their completion signifies the completion of the project. For instance, the initiation of an immunization activity illustrates the essence of a project in the public sector. The difference between a plan and a portfolio is in the extent and timeline of the events. Moreover, projects can serve as parts of a program. The portfolio refers to a selected group of proposals, plans, sub-portfolios and operations managed strategically to warrant the attainment of the objectives of the organization. It also indicates the resources available to a government based on their expertise and physical knowledge to drive their agenda. Portfolios serve as the combination of the projects and programs in the public sector. Also, it acts as the guide in the execution of the objectives of the government towards its people.

Nonetheless, the identification of the different levels of operations in the public domain is fundamental in highlighting the role of managers of the relevant departments. However, the varying levels remain units without the institution of the organization. According to Nicasio (2016), the government lags in the implementation of appropriate strategies to warrant the attainment of its objectives. Therefore, the level of organization in the public domain faces more constraints that the private sector can manage at all stages. The management of resources available to a country based on the operational policies and enforcement agencies warrants the appropriate implementation. The policies dictate the conduct of the organization regarding their operations and the fulfillment of their goals. However, in the public sector, the workforce often manifests laxity regarding their adherence to the requirements of the policies.

Additionally, the enforcement agencies illustrate the same incompetence which lowers the performance of the government organizations. Nonetheless, policies are instrumental in the attainment of the congruence in the activities of the state. It stipulates the appropriate course of action during the management of the projects and programs in the public domain. As a result, the policies of the state determine the portfolio management techniques utilized in the sector. However, there is room for innovation to enhance the benefits of the framework. Consequently, the responsible parties in the design and implementation of programs have to prioritize interests and public welfare when running their programs.

Despite the presence of policies in the public sector that strive for the attainment of order in operations, they also target economic viability. The private sector plays an essential role in driving the financial performance of a nation, but the stability of the public sector influences the GDP. Therefore, for better performance, it is vital to address economic prosperity in the public domain. Strategic innovation practices not only ensure the operations of the department but also promotes the growth of the business performance. It deals with the allocation of the resources to ensure optimum utilization. Additionally, strategized approaches necessitate the evaluation of the available mechanisms to ensure that the manager selects the most cost-effective framework. Nicasio (2016) indicates that the public sector often borrows operational ideology from the private sector. The efforts of the department to emulate the strategies of their counterparts are to seek the same success rate. The innovation strategies facilitate the introduction of the economic and social relationships that guarantee the provision of appropriate public service. The objectives of the public sector projects are to improve the quality of life and ensure they attain an increase in the income levels of its population (Norrie, 2006). The attainment of the object is dependent on the capacity of the management in the public sector to utilize the current innovation techniques to improve the rendered services. Nonetheless, the alignment of the available technologies with strategic management will promote the chances of providing satisfactory public outcomes. Therefore, the innovation strategies help in the integration of the available resources with the methodology of operations to warrant job and consumer satisfaction from the public sector.

## 1.3. Research Rationale

Innovation has increasingly developed attention across the literature that focuses on practices of the public sector. However, most of the publications are "mainly based on conceptual or normative articles and books, thereby lacking an evidence-based approach" (De Vries et al. 2014, p. 2). In that instance, this has encouraged De Vries et al. (2014) to conduct a systematic review of the literature from the year 1990 to 2013 particularly on public sector innovation focusing more on the factors influencing the association between innovation process and innovation outcomes. The research proposed an agenda for future studies on public sector innovation that address different methodological, theoretical and empirical gaps. The following are the main questions and area for studies proposed by De Vries et al. (2014) which are significantly relevant to the context of the current study:

- "Clarification of outcomes. The lack of clear reported outcomes suggests that this topic is under-researched. Hence, future studies could more closely examine outcome criteria or standards to evaluate success or failure. Specifically, researchers should refine their understanding of the mechanism by which the determinants produce (or fail to produce) the outcome of interest in a particular context" (p. 28).
- "What is the detailed process by which new ideas adapted by individuals affect innovation outcomes and how might this process be systematically enhanced?" (p. 28).
- "Adoption and diffusion-related influential factors. Results regarding the drivers and barriers in the adoption and diffusion stages of the innovation process show that influential factors which stimulate or hamper innovation might not be that different as commonly expected. Further research should see if this is the case, the concept is supported by some

> scholars arguing that in the public sector not enough attention is spent on adoption and diffusion (Korteland and Bekkers 2007)" (p. 28).

The purpose of this research is to investigate the underlying decisive knowledge researchers and practitioners have about innovation practices at different public organizational levels. The assessment is bound in the public sector to outline some themes that characterize the major issues and concerns that constitute the debate about the association of innovation practices with potential novelty outcomes as a field of study.

The profound demand of government innovation along with the full range of projects and strategy practices that need to be adapted has primarily led to thoroughly investigate on such topic and standout as an area for interest. The researcher has developed thoughts on how public organizations can foster innovation while executes a vast number of public concern projects, yet some are not mature neither consistent in project management activities. Nevertheless, change creates a thought of it as an operationalized and part of all organizational elements to optimize its impact realization (Jing et al. 2017). Another factor that could drive the innovative performance is the set of required skills at each innovation stage. Though, why skills are crucial to the innovation process? The aspect is due to innovation predominately relation to transforming the mindset into meaningful work in an organization (Giustina et al. 2015). This work is ultimately lead to significant business results emerging the impact and improvement in organization position. Therefore, innovation skills could act as enabler factor that significantly influences the innovation practices. In that sense, synthesizing the concept of organizational performance at a different level to create public impact and taking into account the required skills would need thorough investigative research. The public sector has not given much attention to such vital concepts (De Vries et al. 2014), in which led the researcher to pursue research in this domain as an attempts to bridge the gap between the contribution knowledge and help practitioner to formulate innovation diffusion and training policies.

## 1.4. Research Problem

The modern dynamic and quickly changing environment causes necessary modifications in the activities of private and public sector entities, as well as their business performance. While striving to achieve a sustainable competitive advantage, firms need to adopt new strategies fitting the new requirements in the sector of their operation (Gary, 2015). However, in the opinion of Mankins and Steele (2005), only an insignificant portion of the firms' strategies is realized successfully, and their potential value is rarely utilized in full (Umar and Robert, 2017). The government sector is facing pronounced challenges in achieving its strategic goals and entirely align project, operations, and resources (Nicasio 2016). Theorists and practitioners' attempts to introduce strategic management concept in the application of project portfolio management to establish strategic alignment across the business functions.

In this context, project portfolio management facilitates the simultaneous control of complex projects aiming at a reasonable allocation of resources (Dietrich and Lehtonen 2005; Matilda et al. 2015); in which it means a collection of "programs and projects that meet a specific business goal or objective" (Heldman, Baca, & Jansen 2007, p. 7). The ultimate objective of any program or project in the portfolio is to meet the strategic goals thereof, thus fitting the overall strategy of the company. Mainly, governmental organizations lack appropriate mechanisms, processes, and competent leaders who would make strategically sound decisions for effective management (Markus and Jacobson, 2015). Therefore, there is an urgent need to investigate ways of ensuring optimum performance in the public sector through linking project objectives with the overall strategic goals of the organization and ultimately nation policies.

Nevertheless, enhancement of public sector practices and performance go beyond measuring the outcomes of projects, products, and services (Daniel et al. 1997; Vinicius et al. 2016). They need to integrate organizational change which at this essence is considered inevitable to be adaptable with constantly changing business dynamics (Rune 2007). Theorists responses to these challenges with main approaches; it is either making changes in answer to problems as a reactive approach or anticipating the possible future problems and opportunities to react and meet the demand as a proactive approach (Peter et al. 2016). Therefore, innovative concepts and models occur as knowledge and experience application to conceptualize those approaches. The concept of innovation can be manifested in new organizational structure through process, service and product innovation, as all change begins with creative ideas (Jerry et al. 2011). While at the same time Trott et al. (2016, p. 11) argued that "One of the key limitations of current models of innovation is that they still represent variations on the common pipeline architecture. Also, they are not embedded in the strategic issues of company boards and, therefore, remain isolated entities". In this case, the concept has struck a sense of urgency to integrate a mixture of influential factors that can stimulate innovative strategy and foster a proactive response to the new opportunities and existing public sector constraints. More importantly, measuring the progress toward achievement of innovation strategy would need further investigation on the development of innovative techniques or proposing a comprehensive assessment framework that will help the policymaker realize the impact of innovation’s related decisions and policies.

The previous research on demand of skills in the public-oriented organization to make the best use of innovation has proven difficult. However, with the dynamic and competitive environment in the corporate world, critical and unified skills are required to keep innovation in the public sector at par with that of private organizations. Recognizing the dynamics between skills and innovation most deployed frameworks match the gap that exists between the education system and the labor markets. The future of the organization in terms of innovation diffusion needs a complete match between existing individual capabilities and expertise required by an organization to remain competitive. Empirical evidence on the gap of skills needed suggests that the right combination of technology and organization innovation enhance personal competencies (skills). The underlying aspect is that strategic framework adopted by an organization creates an avenue for employees to better understand effective ways of skills development relevant to targeted innovation. Therefore, for a successful diffusion of innovation skills gaps needs to focus on, in order to articulate the technological trends, organization novelty and expected changes in human competences in public sector projects.

## 1.5. Research Questions

The research questions that would eventually guide down the relevancy of this research journey are stated as the following:

1. What are the innovation practices at each public organizational level?

2. What are the necessary skills for innovation diffusion?

3. What are the performance indicators (measures) for innovation outcomes?

4. What is the influence of innovation practices and skills on innovation potential outcomes?

## 1.6. Aim and Objectives

**This research aims to measure innovation practices and skills that are necessary for innovation diffusion from strategy to project level in government institutions.**

To achieve the ultimate aim stated above, the author has also identified several research objectives:

1. To review and extract innovation practices and performance measurements.
2. To review and extract innovation skills required for innovation diffusion.
3. To find the association between innovation practices, skills, and outcomes.
4. To survey public sector practitioners.
5. To analyze the data from the survey using several statistical techniques.
6. To report the results and confirm research hypotheses.

## 1.7. Research Hypotheses

Based on the research problem discussed earlier, and the stated objectives and questions; the general research hypotheses are formed as follows:

1. The innovation practices are associated with potential innovation outcomes.
2. The innovation skills are associated with potential innovation outcomes.
3. The association between innovation practices and potential innovation outcomes is influenced by the innovation skills.

## 1.8. The significance of the Study

This study provides an important redefinition of the competency and the multi-cultural abilities to enhance the sensitivity of innovation diffusion with a clear understanding of diversities that define societies in which public-based organizations operate. Innovation skills involve a wide range of diverse approaches meant to create an interactive environment for new technique deployed across the public sector. The study offers an exciting knowledge approach that supports the overall guidance to the competence embraced to ensure innovation is relevant to the subsection of a general division. The capabilities and skills of workforce create know-how pathway that helps the management to go for the right measures while the process of promoting excelling of the enforced innovation. Importantly, the persuasion offers a knowledgeable concept that innovation cannot work without a particular link of communication. The interpersonal exchange of information among the department in public-based organizations enhance the creation of directives that both the negative and positive outcomes of interventions.

There are several areas where the study has made original contribution shown by ample evidence of innovation studies at the organizational level that is relevant to the private sector. This argued by Bugge and Bloch (2016, p. 1467) that "Innovation has traditionally been studied in the private sector". Nevertheless, there is an increased awareness about the gap in the literature concerning public sector innovation studies (Osborne 2013), and researchers believe that innovation can play a significant role in the public sector (Turnheim and Geels 2013). Mehmet et al. (2017) asserted that the reason for the scarcity of public sector innovation studies in the literature is due to the shortage of innovation measurements. The findings from this study will make a vital contribution to fill the gap in the literature by providing empirical research addressing public sector practices in diffusion and measuring innovation initiatives, and exploring the related factor that can create a public impact. Besides, this study aims at creating insights into the sense that it’s founded on the basis of expanding the previous work and the knowledge related to public sector practices in creating innovation impact at social and economic perspectives, with a specific focus on innovation transition from project up to strategy and government level. The study also makes a major contribution to the research on the innovation diffusion in public sector through providing a solid ground for the researchers and practitioners to integrate critical reviews of relevant theories and empirically studied innovation practices and skills required to diffuse novelty in the communal-oriented businesses.

Therefore, this study undertakes a logical attempts and the longitudinal analysis to make noteworthy contributions to the body of knowledge emerging from the theoretical understanding of innovation practices at different levels, whereas most of the current studies looked at this practice from organizational level solely (Mehmet et al. 2017). Finally, the study aims to contribute to growing areas of research on innovation diffusion to demonstrate uniqueness performance in a sense that it will serve academic researchers and practitioners to bridge the gap in the existing body of knowledge.

## 1.9. Thesis Outline

The research is designed to assist in achieving the aim and objectives of the current study and support in addressing the pre-defined research questions. As portrayed in figure 1.9, this research is conducted and arranged in 11 chapters. The following points provide a summary of each chapter contents:

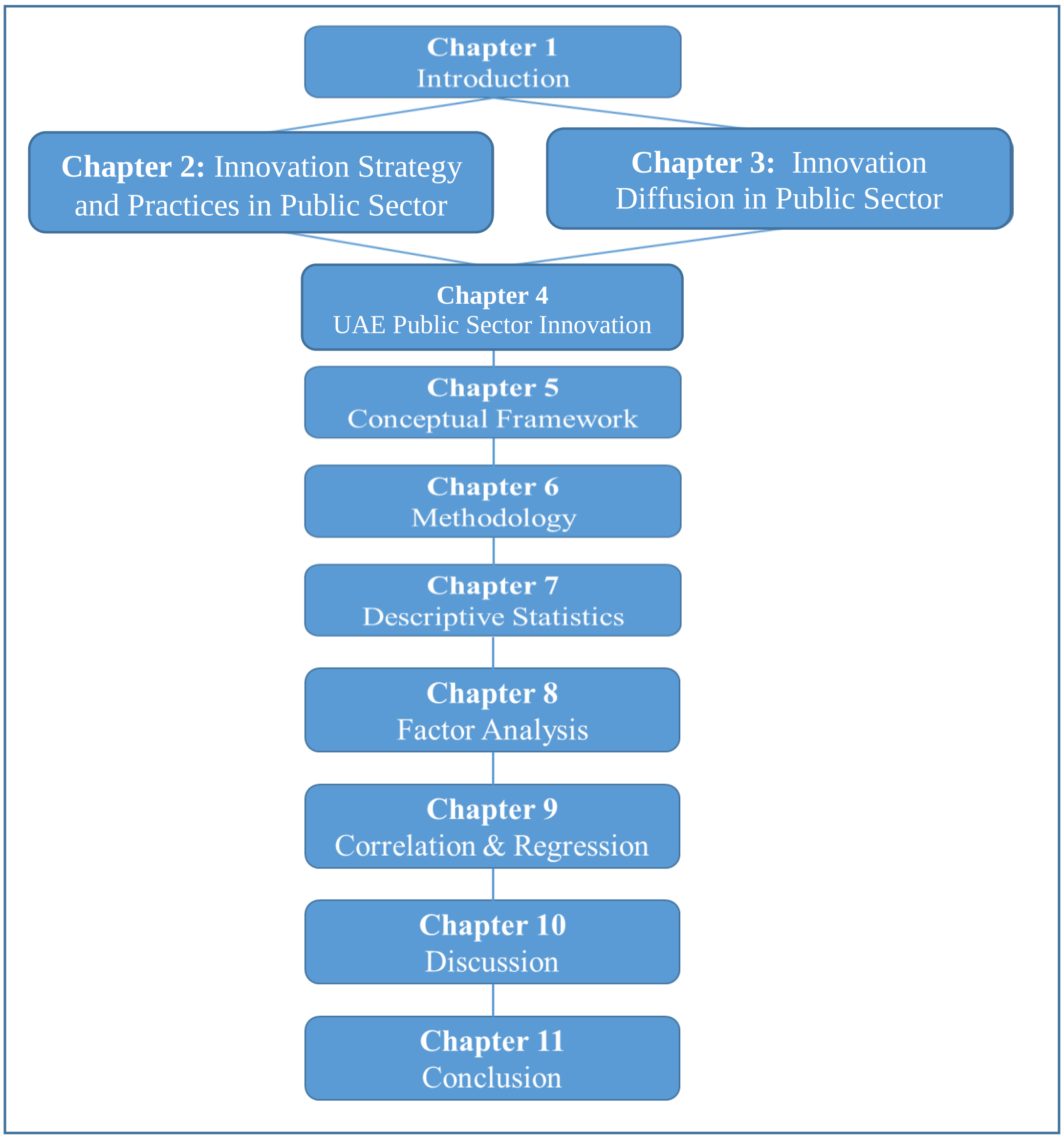


Figure 1.9: Thesis Outline

- **Chapter 1:** The chapter introduces the general background of the research topic, discusses the rational, identifies research problem and questions, defines research aim, objectives, and hypotheses, describes the significance of the study, and presents thesis outline.

- **Chapter 2:** Presents a critical review of the literature about the project ecosystem in the public sector, innovation-based strategies, elements to construct an innovative strategy, national innovation systems, public sector innovation models, and measuring innovation performance.

- **Chapter 3:** The section discusses the diffusion theory, enablers' factors in the context of innovation diffusion across the public sector, and stage and skills of innovation diffusion.

- **Chapter 4:** Reviews the UAEs capability as an innovation hub, stimulating the environment for innovation adoption, and innovation diffusion across UAE,

- **Chapter 5:** Discusses the main research constructs, proposes a conceptual framework for the study, formulates research sub-hypotheses, potential innovative outcomes, innovation practices, innovation skills, and contribution to knowledge.

- **Chapter 6:** Introduces different research philosophical approaches and methodologies, explains the research outline, philosophy, strategy, and research methodology. The section also reviews time horizon, research techniques and procedures, study questionnaire development and sample. Also, the survey instrument of the existing study, and elaborates on the ethical considerations and research limitations is considered.

- **Chapter 7:** Discusses the validation and the reliability analyses of the instrument used in this research, illustrates general information gathered from questionnaire participants and provided descriptive statistics of demographic characteristics and main variables used in the study.

- **Chapter 8:** The section avails an in-depth presentation of factor analysis tests for the variables of distributed questionnaire and shows the result of each performed test, explains the newly explored factors including strategy level measurements, strategic alignment, knowledge stage skills, persuasion stage skills, discussion stage skills, implementation stage skills, and scaling-up stage skills.

- **Chapter 9:** Presents the results of performed correlation and regression test, shows the significance of the relationships between the dependent and independent variables of this study, analyses the variables that have mediating influence on the link. The correlation and regressions are also reviewed based on the innovation performance measurements and skills.

- **Chapter 10:** discusses and provides of an overview of the study, review of performance level measurements, analysis discussion of innovation skills, analysis discussion of innovation outcomes, evaluating factor analysis results, and discussion of overall regression and correlation results. The chapter also analyses vital research questions, outlines the findings drawn out form this thesis, discusses the findings of descriptive statistics and the newly emerged factors from the factor analysis exercise, and presents the results from the literature review.

- **Chapter 11:** presents the underlined conclusion and restating the research objectives and methodology. It consolidates the accomplishment of the study purpose, robustness of research methodology, implications of the overall research, a distinctive knowledge contribution and the limitation the study ought to face in pursuance of the objectives.

## 1.10. Summary

The chapter has intensively laid a background for the study by introducing the idea and the rationale of this research. The context of innovation in the economy is presented in a fully open manner to enhance a source of knowledge on how it operates in a public sector. Notably, the rationale and research questions developed in this section prompt guidance for the researcher to have a systematic approach to tackle and work on the study topic. The logical outline and the presentation of every single chapter promote the research neatness and quick location of reviewed areas by the readers.

# 2. CHAPTER TWO: INNOVATION STRATEGY AND PRACTICES IN PUBLIC SECTOR

## 2.1. Introduction

This chapter systematically reviews literature around the innovation practices, strategies and models applied in the public sector across the UAE. The research also explores the methods of project-based innovation and explains how projects, program, portfolio, can be aligned with the organizational and policy levels and presents public sector practice in projects and strategic management in the context of innovation.

## 2.2. Innovation Ecosystem in Public Sector

The public sector in developed countries has made considerable efforts to promote change. Therefore, innovation has a high reflection of public entities' plans and strategy. In that sense, innovation strategy has become increasingly deployed across the public sector and defined as a commitment to a set of policies, management philosophies and behaviors aimed at directing organizational efforts towards advancements in services or product development and aligned with the government's overall strategy. Andrew et al. (2015, p.2492) in their research study found that "innovation strategy is instrumental in linking the expertise workers and product development efforts". Besides, the researchers exposed that innovation strategy can exert a powerful influence on corporate performance to enhance the company achieves more proficient product development outcomes.

According to Green et al. (2014, p. 38) public sector experiences more frequent and uneven innovation which occur due to the internal systems of the respective organizations. Contemporary state and local agencies have specialists across all fields of IT, human resource, performance management, and finance. However, the same organizations are likely to lack expert innovators (Potts 2009). For instance, it is not easy to find active board members in these organizations handling a pipeline of viable new models, or teams showing clarity on acceptable risks or success, or leaders with the ability to explain the expenditure on research and development or innovation (Mulgan, 2008). The attributes refer to the spirit of entrepreneurship, implying that public sectors need entrepreneurs who can take risks and carry out extensive research to design innovative strategies. Therefore, they form an essential element in developing innovative long-term initiatives in public agencies (Agarwal and Selen 2009).

In Europe, the technical universities attempt to understand entrepreneurship and innovation as an essential element of creating a new technology-intensive of future business (Trott et al. 2016), argues that "the role of an entrepreneur is central to innovation management" (p. 4). In this case, entrepreneurs form the basis of effective, innovative management in organizations. The approach leads to the notion that effective and innovative management describes the method of organizing the generated knowledge, operations, processes, and innovation (Sorensen and Torfing 2011). Eggers and Singh (2009) assert that sufficient innovation in the public sector should involve reasonably performing various roles. In other words, it entails robust management of the entire integrated innovative operations like sourcing and implementing ideas (Hughes et al. 2011). Thus it indicates that the cycle of innovation lies within the enterprise and offers an opportunity for the organizations to learn about new and useful ideas, weaknesses and strengths of the agency in managing change (Hartley 2006). As a result, for a public sector to become innovative, it has to undergo learning from past experiences and also internalizing the lessons learned from the processes, organizational arrangement, skills, and linkages. Trott et al. (2016) argued that all organizations could achieve a healthy financial position if creative entrepreneurs are encouraged to intensively invest in the public sector and develop new products or services. Therefore, the organization needs to institute a wide-range innovation ecosystem to facilitate the effectiveness and sustenance of innovation (Agarwal and Selen, 2013).

Kale and Singh (2007, p. 995) argued that designing an innovative ecosystem in public organizations needs both strategic accuracy and capabilities of a higher order. The sophisticated capabilities facilitate the extension, modification, and improvement of the ordinary competencies of an organization staff entailed in managing the relevant tasks. Furthermore, to establish greater innovativeness, public organizations need to develop systematic changes in management roles such as decision making, planning, culture, accountability, routines, and training (Klein 2010). Green et al. (2014) depicted three vital elements to transform the public organizations into an innovative hub. First, strong leadership needs to facilitate strategy change, decision-making, the creation of the incentive structures, facilitate resource allocation, and promote learning and experimenting (Krings et al. 2006). Notably, it's the role of public sector resource management to facilitate training, research, and development, establish relationships and experiment with various new programs (Bason 2010). Lastly, its vital to define experience necessary for the transformation process and incorporation of modern expectations, skills, routines, and cultures (Anthony et al. 2006).

## 2.3. Innovation-Based Strategies in Public Sector

The public management is significantly changing with globalization forces to become more active, responsible, and democratic in exercising governance (Raipa and Giedraityte 2014). The outcome shows that the change in these public frameworks entails the transformation of the control systems and the related subsystems to modernize the current governances (Arunde et al. 2013).

Therefore, innovative strategies aim at upgrading the current policies and operations in the public entities. Strategy formulation is a creative process that requires original, introspective thought for moving the company towards the goal achievement. The plan is primarily about the future direction of a company, so its formulation is impossible without creativity, imagination, and intuition for choosing the right future direction of the entity. Achieving such a positive outcome requires involved partieson to keep the viability of an organization in the market, strategic planning acts as a tool for strategy formulation. The strategic plan was defined by Russell and Russell (2005, p. 10) as "creating a strategy for achieving the organization's goals and then devising an organized method to accomplish such plans". Nevertheless, it is necessary to keep in mind the fundamental difference between strategic thinking and strategic planning; while the latter translates strategy into action, the former seeks understanding of the present events for the sake of finding the best way of facing the possible future changes.

For a business strategy to be innovative and result in organizational success it has to make sense to all members of the organization; there is a need for a commitment to scheme's implementation among staff, and the organization must possess considerable execution ability (Yaeger and Sorensen 2009). Kaufman et al. (2003) also added that strategic thinking is successful in case the company's strategists move beyond accepted paradigms and apply more creative, unexpected patterns of thought, planning, evaluation, and continuous improvement. Other factors critical for strategy's success include reasonable differentiation between means and ends (the "how" and "what" of the procedure), use of all levels of planning (micro-, macro-, and mega-level), inclusion of precise statements of strategic direction, and use of an ideal vision as a basis for planning and continuous improvement (Kaufman et al. 2003). The public sector needs explicitly to imply the spirit of innovation and create a sense of entrepreneurship that carry out extensive efforts to formulate innovative strategies (Agarwal & Selen, 2009).

Public sector innovation refers to the process through which new ideas are generated and implemented to create value for the society (European Commission 2013). The two characteristics that are considered significant for a public sector innovation is that it must be implemented as a novel plan in that its entirely new or it offers a substantial improvement when executed (Daglio et al. 2014). Halvorsen et al. (2005) presented four ways in which innovation can be introduced or generated in the public sector. First, through technology procurement which brings better ways of delivering public services and producing public goods. This approach requires the public sector to have the absorptive capacity which facilitates the ability to assimilate and transfer the technology to the entity (Anthony et al. 2006). Secondly, technology development takes into consideration the internal innovation of improved or new production processes, work organizations, and artifacts both at the systematic and personal level (Rainey 2007).

Further, the bureaucratic and organizational reform undertaken involve the conceptual innovation, innovation in system interactions, and the administrative modernization (Boyne 2010). Conceptual innovation involves privatization strategies aimed at downsizing the public sector. Contrary to changing ownership of the firms the managerial innovation entails the development of entrepreneurship or managerialism in public institutions (Schilling and Werr 2009). Systematic innovations necessitate the reforms aimed at strengthening the relationship between a private and public sector (De Vries et al. 2014). Lastly, incorporating designing new policies and changes lead to the introduction of entirely different concepts.

Boyne and Walker (2004) defined the strategy process as the way in which actions and objectives are formulated or selected. Strategic content forms the results of this process and shows the pattern or framework through which the organization is proposing to achieve the desired objectives and goals. Boyne and Walker (2004) conceptualized strategy content in two levels. At the first level, policy content acts as the general approach which defines the position of any given organization and its interaction with the environment. The broad approach confirms the scale as a strategic stance where the entity seeks to improve or maintain its performance (Anthony et al. 2006). The standard is enduring and unlikely to undergo significant transformations in the short-run. The second level necessitates the specific steps which an entity undertakes to optimize the strategic stance (O'Byrne et al. 2014). It describes the decisive actions which have a high probability of changing in the short-run. These two levels can be used to design innovative strategies in public organizations.

## 2.4. Key Elements to Construct the Innovation Strategy

There are various empirical studies which support the elements of constructing an innovative plan in the public sector. For instance, Sellick (2011) studied the promotion of innovation culture in the United States Government. The findings showed that effective leadership creates innovation space, defines success, encourages risk takings, tolerates failure, and facilitates learning for improvement. Besides, the government institutions are permeable for new ideas, insights, and processes. The staffs get rewards for system designs, improved performance, and good intentions. In South Australia, Mulgan (2008) found that strong leadership in the public sector promotes innovators, celebrates creativity, and accepts the existence of failure towards greater successes. Accordingly, state organizations need to design effective approach towards innovativeness through eliminating cognitive and cultural barriers, sheer inertia, and vested interests (Australian Government 2011). The outcome is achieved through building networks for information sharing, promoting best practices, and creating incentives to facilitate the adoption of innovation (Birkinshaw et al. 2008).

Ochojski and Baron (2015) argue that the complexity of services and products provided by the public sector has increased the need for innovative strategies to improve efficiency. The current public sector has traits of new approaches of management and governance processes aimed at boosting efficient operations and service delivery. The service operators in this sector are offering innovative project, methods, and products to deliver more value to the public (Parston 2007). The critical internal contributors to the innovative strategy in public organizations include the entrepreneurial and leadership attitude and intra-organizational joint efforts (Borins 2002). For instance, in local municipalities, principled municipal manager digs deeper into expertise solutions to increase the speed of service delivery and quality improvement to the public. On the other hand, adequate government funding and robust regulatory frameworks act as the eternal inducements towards innovation strategy (Bommert 2010). Organizations differ in the policy adopted in the process or product development projects, while such proceduries end up influenced by the aim of the project, and the availability of resources and capabilities (Dusana et al. 2016).

Ochojski and Baron (2015) studied innovation in public institutions across Central Europe with emphasis on local public organizations. Examples of these innovative initiatives under their survey included the intelligent traffic lights, smart energy grids, and passive buildings. The study interviewed public managers, private service operators, public agency officers, and policy-makers to determine the factors that enforce and affect innovative strategies. The findings show that the local institutions incorporate innovative processes that lower the costs of offering services to the public.

O’Byrne et al. (2014) studied social innovation in South Korea using Seoul Metropolitan Government (SMG) as the case under survey. They found that effective social innovation in this public sector was brought about by strong leadership, innovative culture, and collaborations to facilitate innovation (Kim 2011). The findings indicate that SMG partners with various NGOs to promote civic engagement such as debates on decision making, protecting the use of public resources, and defending human rights (O’Byrne et al. 2014, p. 59). Also, the SMG link their efforts with private housing authorities to improve the housing standards for the lower income citizens (Cohen 2009).

In Lithuania and the European Union’s public sector, Raipa and Giedraityte (2014) found three categories of barriers to efficient innovation processes that includes political, internal, and external obstacles. The internal constraints involve the lack of adequate human resources and funding, insufficient incentives and management support for the workers, staff resistance, a risk-averse culture, and uncertain acceptance. As mentioned earlier, political barriers impose administrative burdens and delivery pressures in the form of short-term planning horizons and budget allocation. Therefore, to improve innovation in the public sector, the study recommended for strong management support, sufficient financial and human resources, incentives to state employees to reduce resistance, reducing regulatory requirements, and encouraging risk-taking culture (Borins 2006). Notably, any successful innovation process needs a breaking of the set rules that create unnecessary bureaucratic procedures (Bland et al. 2010).

## 2.5. National Innovation Systems

National Innovation System (NIS) refers to the mechanisms that a state puts in place to harness its creativity and innovative aspects from the different sectors of development. NIS boosts sets of the economic areas through the promotion of industrial clusters that foster both competition and innovation among the various inputs meant to achieve the national development (Borins 2014). Furthermore, it facilitates social development through the devising of programs that will improve the living standards of the population. Additionally, the NIS fosters the establishment of better communication infrastructure to promote representation (Crosby et al. 2016). The current perspective of NIS is based on the idea that innovation is usually created in a systematic context rather than in a linear way (Joseph et al. 2013). The process of change ends up influenced by a set of mechanisms and interactive relations that regards it as a product of several factors. According to Joseph et al. (2013, p.167) "there is a need to study the whole system of institutions and organizational elements and processes to understand the phenomenon of innovations in the public sector (Nystrom 1990)".

Due to the demand of the modern world, mechanism whether in the private or public sector has the responsibility of meeting high standards. The available technology provides several opportunities for improving service. Therefore, the national innovation systems have the mandate of ensuring they correspond to the public service demand. Nonetheless, the results portray that the public sectors are underperforming relative to their private counterparts. Research into the national innovation systems reveals that they can enhance their performance levels through the integration of different strategies (Hartley 2013). Notably, the inclusion of the mechanisms utilized in the private field will facilitate the attainment of expectations of the public. Trott in an article titled “The Management of Technology and Innovation: A Strategic Approach”. assert the role of the government in setting national innovation system and policies is essential in the sense that it can enhance the generation and commercialization of innovation (Trott 2007). The author reveals that the politicians care about change through stimulation of innovation across the public sector divisions. For instance, in the Europe Commission, the authors confirm that authorities treat innovation in the public sector as a central element to enhance the growth of the economy across the region. According to the article, the marketing and derivation of profit from the public sector present a problem to its management.

Additionally, it points out that most economies incorporate innovation as part of enhancing competitive advantage and that long-term financial success. Therefore, top government sectors have combined the aspect of science with legal policies to bridge research and development for the success of the public sector. Nevertheless, problems with the current methods utilized in the local industries and the management of projects or programs need redress (Martinsuo et al. 2006).

According to Marxt and Brunner (2013) in the article, "Analyzing and improving the national innovation system of highly developed countries - the case of Switzerland", the country owes its leading position in innovation to broad Europe due to its approach. The authors highlight that Switzerland uses a systematic approach regarding its national innovation system. The framework entails a multi-disciplinary mechanism that ensures delivery interactions both at the institution and organizational level is prominent (Fernando et al. 2014). The coordination facilitates the collaboration of various systems subject to the benefits of innovation efforts including the integration of technological institutions and universities. The centers serve as the most appropriate avenue to implement the current innovative trends. However, the article is specific since it utilizes innovative factors stemming from the Switzerland context. Therefore, it is difficult to compare the situation directly to that of the U.A.E. nonetheless, the implications of the results can serve as a benchmark to improve the national innovation systems in the country (Marxt & Brunner 2013). As a result, the research uses the systematic approach that necessitates the coordination of results from the technological and tertiary institutions to infuse the current trends.

The move will facilitate the integration of the most relevant methods thus fulfilling the objectives of national innovation systems in the country.

## 2.6. Project-Based Innovation

The essence of project-based innovation is different from the traditional aspect due to the difference like final results and expectations. The project-based innovations model acts in full responsibility to deliver custom-made products to the consumer population.  As a result, the creativity and system application at the two levels is different (Agolla and Lill, 2013). Regarding the public sector, project-based innovations facilitate, the completion of projects with the interests of the public acts as a priority. Additionally, it is essential to reveal the difference because it helps in the dedication of appropriate efforts and warranting innovative culture embracing within the most convenient time.

Fernando et al. (2014) state research targeting project-based innovation is lacking relevant interlink to the current organization original objective. The author reveals that the paper conducts an extensive study to avail the fundamental mechanisms that propel project-based innovation success. However, the focus of the paper deals with the construction field. However, the area is relevant to the research because the public sector involves various construction projects. The mechanism will serve as insights in projects that entail construction and will cover the interests of the public (Fernando et al. 2014). Furthermore, the approaches that Fernando highlights promote innovation and adhere to the spending capacity of both the projects and its sponsors.

Martinsuo (2006) in the article “Project-based management as an organizational innovation” states that innovation is pivotal in the initiation of change regarding the management operations. The author reveals that creativity facilitates the development of a different approach to control the activities of the institution. However, the author illustrates that the imitation of innovation in the project-based project is challenging due to the custom-made requirements. As a result, the parties that borrow the idea will only use the guiding opinions and tailor-make it to address its concerns. The research intends to use the concept of uniqueness to ensure that the projects in the sector do not suffer as a result of imitation (Martinsuo et al. 2006). Often, project managers borrow concepts without considering the differences in the interpretation of the consumer population in such context and that of the project. As a result, the alignment of the borrowed aspect with the background is vital to the attainment of efficacy.

Modern companies are moving towards project-oriented ways of managing their business, which gives a set of advantages but also poses particular challenges, such as ensuring that selected projects are implementing the strategy of the company, and resources allocated to the right projects (Urli and Terrien 2010). An effective program or project should be of economic value to an organization which relates to the objectives and goals of the strategy. The relevance of a program or project may change over time (Levin 2006). It is, therefore, important that organizations examine the changes that the whole system has undergone or is likely to experience in the future in deciding on the way forward. Continuous program or project evaluation and change are necessary (Kloppenborg and Laning 2012). The two concepts have interrelations and managers need to establish the preferred merit scales and constantly monitor outcomes. Annual Performance appraisal, as opposed to yearly economic examination, should be conducted to measure the result and address the long-term program or the project change and evaluation activities. According to Kloppenborg and Laning (2012), the organization should constitute advisory committees charged with this activity. The primary challenge with the alignment evaluation is in the identification and collection of data that is useful in measuring program progress (Kloppenborg and Laning 2012).

Recently, there has also been much attention to company spending for project-organized undertakings, with the advantage of single projects' controllability at the expense of loss of the whole project landscape's transparency (Jonas 2010). Project and program management emerged as a distinct phenomenon adopted by many firms as a creative method for solving complex organizational problems and activities (Jonas 2004). Lavagnon (2009) states that it requires different approaches to measure project success and envisage a trend toward a shift to the project, portfolio, and program success regarding their multidimensional nature, as project success is an object of study that defies consensus on its definition and measurements.

As many types of research are carrying out on the field of engineering, construction, and information technology, this might place a dominance of the triangle view (quality, cost, time) of project success (Otávio et al. 2017). Nevertheless, the public sector and other institution in softer industries place a higher emphasis on portfolio, project and program management (Lavagnon 2009; Cicmil, and Hodgson 2006; Jugdev and Müller 2005). Often, managers face the project–strategy alignment sustainability issues. Alignment is evident at the beginning of the project but fades as more activities get involved (Dinsmore and Cabanis-Brewin 2011). Such an aspect has been shown to limit the organization's ability to rethink strategies and effectively respond to changes in the economy. The approach often leads to decision making based on the priority that is perceived instead of the actual needs (Rad & Levin 2006). In that sense, strategically managed projects are dedicated to achieving business outcomes, while operational managed plans focus on the routine work and getting the job done. Through this prominence on the project, portfolio, and program success could have the realistic anticipation that knowledge production on project success relies more on senior management who can make strategic decisions in project selection and design. LaBrosse (2010) added that in the process of project and program selection to the portfolio, such aspects as return on the investment, costs, required resources, risks, and timeframe for the project completion get evaluated together.

Similarly, with the projects' strategic fit for making the ultimate decision regarding the project's value for the organization. Hence, prioritizing of projects becomes complex as some criteria are hardly quantifiable, and only financial estimates are more or less accurate, nevertheless giving scarce information on the benefits of the plan for the company in general. The availability and careful allocation of resources available needs to be sustainable (Rad and Levin 2006). The objectives become achievable through monitoring and evaluation conducted by the mid-level managers assess the allocation and utilization of scarce resources (Harpum 2010). Resources available need some alignment to the administration's strategy. Organizations tend to propose multiple projects which may not be sustainable. Thus this may overwhelm the organization and result in stagnation.

Given the specific nature of portfolio management as a modernized investment management concept in governmental organizations. Researchers and practitioners considerably praised the role of portfolio management that deals with coordination and control of multiple projects and competing for the adequate organizational resources to put together plans with value-added at corporate-wide. According to Levine (2010), the portfolio can maximize the contribution of each separate project to the overall welfare and success of a business. Hence, project portfolio management (PPM) emerged as a distinct phenomenon designating a group of projects and programs competing for scarce resources and conducted under the sponsorship and control of a particular organization.

Project portfolio management is the field of management dealing with coordination and control of multiple projects pursuing the same strategic goals and competing for the same amount of limited organizational resources. Rajegopal, McGuin, and Waller (2007) assumed that PPM represents a paradigm shift in thinking about projects and their implementation; it represents the new vision of project implementation driven from the top down and spearheaded by the executive and senior management sponsorship and responsibility. Therefore, PPM has envisioned attributes as a tool for closing the gap between projects, their management, and accountability for them. The concept is a sound method that brings the strategic and operational aspects of organizational performance (Rajegopal, McGuin, and Waller, 2007). PPM has successfully worked in non-profit and for-profit organizations, governmental agencies and departments, universities and colleges, utility companies, investment firms, law firms, etc. The choice for PPM application is usually made because of its ability to achieve the estimated purpose by adhering to strategy, goal, and objective alignment, project and program details communication, proper estimates regarding financial costs and benefits, and enabling to manage projects and programs as a holistic, unified system (EPMC, Inc. 2011).

## 2.7. Public Sector Innovation Model

Although the recognition of the value of innovation is a trend in all sectors to define the success of organization majority of public sectors lags in its incorporation. The failure of the firms to fulfill their objectives appropriately stems from the absence of a prominent model that will guide the activities of the company and ensure success. The public sector entails unique consumer population and constraints regarding their resources and expectations. Therefore, the models reflect unique aspects of the organization and key prospects availing strengths to warrant success (Crosby et al. 2016). For instance, the breadth of knowledge in the public sector is extensive due to its association with society-oriented organizations and technological institutions. As a result, the models should align its application to the retrieval of sufficient information. The utilization of its strengths will increase their chances of fulfilling their objectives appropriately. Additionally, the public sector has unlimited access to both skilled and unskilled labor at affordable rates relative to the private sectors. Various scholars including (Donahue 2005; Bloch et al. 2010) admit the essence of innovation in the public sector. They claim that it is prudent to public sector organizations innovation and essential in addressing both the globalization and demographic changes.

### 2.7.1. Strategic Stance Model

The strategic stance model has three elements prospectors, reactors, and defenders (Boyne and Walker 2004). Public organizations integrate a mixture of these elements in formulating innovative strategies to deal with new opportunities and constraints. In this model, the three concepts are applicable in a mutually exclusive way (Bartlett and Dibben 2002). Such interrelation implies that a public organization has three responses when faced with new circumstances; it can innovate (prospector), wait for further guidelines (reactor) or consolidate (defender). The authors reveal that the model can attain appropriate application in the public sector field.

However, the article fails to identify the unique situation that will necessitate a unique course of action. For instance, it reveals that a response of innovation serves as a perspective of dealing with an impending issue (Bason, 2010). However, it does not categorize the actions or instances that will lead to either prospecting, reaction, or consolidation. Nonetheless, the article facilitates the development of an aspect of multiple approaches. It reinforces that the solutions to the current problems will not follow one guide regardless of the variability of the problems. Therefore, the research will utilize the information contained in the strategic stance model to promote the development of an ideal approach that will correct the specific constraints to innovative success.

### 2.7.2. Process Model

Joseph et al. (2013) in the article, 'Public Sector Innovation Drivers: A Process Model' illustrates that the vital aspects in the assessment of innovation include internal and external drivers, collaboration among organizations and continuous monitoring and evaluation with feedback. As a result, the article suggested the appointment of public sector organization managers to rely on the creativity and resourcefulness of individuals as opposed to their political influence. The process model focuses on the activities of the various departments within the public sector management. The process model also promotes the implementation of innovation in a sustainable manner (Buhumaid, Constantin, and Schubert, 2016). The outcome of the process serves as the backbone of integrating innovation in public-oriented entities. This aspect creates consistency in all the developed programmes with competence and capabilities in the society fully exploited.Thus like any other organization, the public sector find easy to coordinate hiring and implementation aspects (Joseph et al. 2013, p. 166). Figure 2.1 Showing the conceptual innovation process in public sector

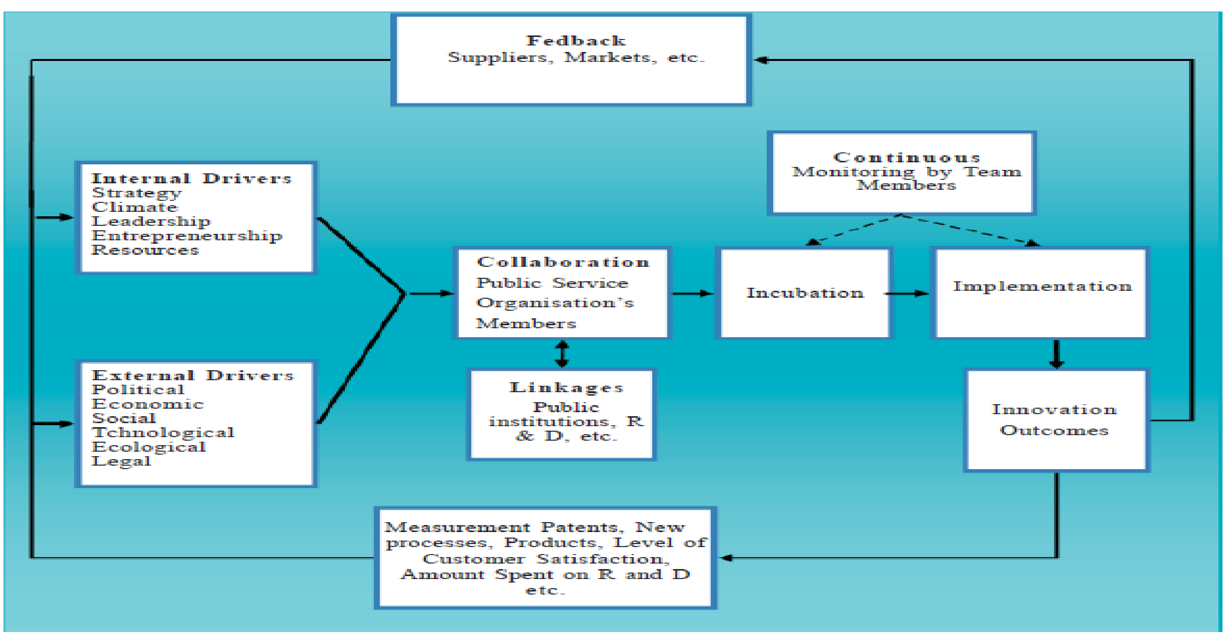


Figure 2.1: Public Sector Innovation Process Model

The basic idea behind the formulation of the model is that innovation results in a systematic perspective. In other words, innovation is the end product of factors like interactive relations and mechanisms. The model depicts a full interaction of external and internal elements of change. The fundamental essentials include organizational climate, strategy, corporate resources, entrepreneurship, and strategic leadership. External factors form the PESTLE (political, economic, social, technological, legal, and ecological) for a specific organization.

Public entities need to establish organizations strategy to facilitate communication and consistent of role-playing to move towards the common goal across all departments. In this case, creativity and innovation get connected by a compelling combination of structure, a support mechanism, communication, and behavior. In formulating strategy, public organizations should: define the change in the context of its operation; evaluate the available drivers; develop the mission and vision; communicate the role of the strategy, and align and integrate the plan with critical resources available. Organizational climate describes the culture concerning attitude, and behavioral tendencies, and the perception of public servants (Bekkers et al. 2011). These attributes depend on how the top management recognizes the staffs' efforts towards creativity and innovation. In this context, the organizational climate needs to be cohesive and supportive to employees to create the necessary stimulus for change (Walker 2014). Strategic leadership facilitates innovative potential and direction in organizations. According to Pagon et al. (2008), the required leadership skills include divergent and critical thinking, problem-solving capabilities, strategic thinking, analytical skills, numerical abilities, and technological skills. These skills also create the basis of organizational entrepreneurship. However, investments require higher levels of interpersonal, psychological, and technical skills (Joseph et al. 2013). The combination of leadership skills, entrepreneurial skills, and the available human resources builds the vital intangible assets of a public organization. Marr (2009, p. 49) argued that these human resources create the key competency and capability of entity management as essential in designing innovative and creative ideas.

As mentioned before, the political environment plays an essential role in the functioning of the public sector. The political desire of improved welfare services lowers operation costs, enhance efficiency and accountability, and fosters innovation. Establishing strategic change in public institutions calls for strong political enforcement and recognition to facilitate the allocation of the required resources. The economic environment shows increasing demand for high-quality products by the public. This demand together with increased competition from private entities creates the need to design creative ways of delivering quality public goods and services at lower prices (Edler and Georghiou 2007).

Social environment describes the attributes of the demography served by the public organizations. Changes in social factors may force the public institutions exit or enter a specific market as illustrated by the model of (Boyne and Walker 2004). The organizations do not influence changes like increased aging population or outbreak of diseases, hunger, or drought. Such occurrences need the considerable creation of innovative ways to address the factors. The technological environment institutes the fulcrum for innovative strategies in public organizations. The introduction of best technologies like e-payment systems, telemedicine, enterprise resource management, and big data analytics creates strong determinant for subsequent innovation (De Vries et al. 2014).

According to Joseph et al. (2013), a collaboration of efforts and delivery levels eliminates the societal, institutional, and organizational rigidities which hinder diffusion of innovation across sectors. The approach facilitates the value creation, cooperation in resource-harnessing, barrier crossing, and skills and knowledge transfer between the public and private sector (Schoeman et al. 2012). In this framework, the government provides a policy outline that facilitates the operation of each specified entity. It determines the demand side policies which affect innovation like smart regulations, consumer education, taxation, pricing standards, and public procurement.

### 2.7.3. Interactive Model of Innovation

The aspects of the innovative model include the needs of the society, the status of technology, and the marketplace. Jon-Arild Johannessen (2009) argues that the model is dependent on the interaction of the research design, prototype production, and the role of marketing and sales. The model is applicable in the public sector through the integration of the prototype production and the prevailing state of technology. The checking of the status of the technology necessitates the development of an improvement relying on the needs of the market and its conditions (Afuah 2003). Moreover, the interaction of the research and marketing illustrates the utilization of the aspect of the private sector to enhance their status of technology. The public sector borrows the technique to promote their competition status against the private sector.

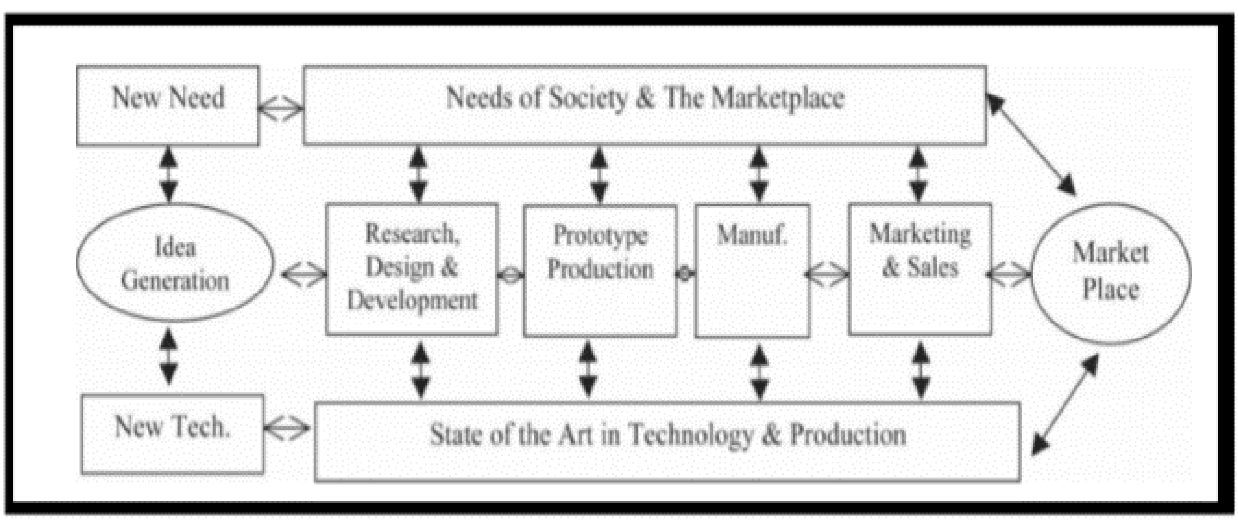


Figure 2.2: Interactive Model of Innovation

### 2.7.4. The Triple Helix model

The Triple Helix model contributes to public sector innovation through the harmonization of the aspects of wealth created in the industries and the legislation. The approach also facilitates creativity and linkage of the research and implementation of strategies to boost innovativeness (Etzkowitz 2008). According to the author, the Triple Helix model illustrates the association of different players in the public sector that complement the innovation system. The author states universities are "an amalgam of teaching and research, applied and the basic competence, entrepreneurial and scholastic interests". Therefore, they serve as an ideal opportunity for the introduction and implementation of innovative ideas. The model has three aspects including the government (legislative control), wealth generation industry, and novelty production. Additionally, it entails a performance cycle that utilizes the three characters but dependent on the political economy, innovation, and knowledge infrastructure (Razak et al. 2016, p. 47). Figure 2.3 shows the interaction of these three players.

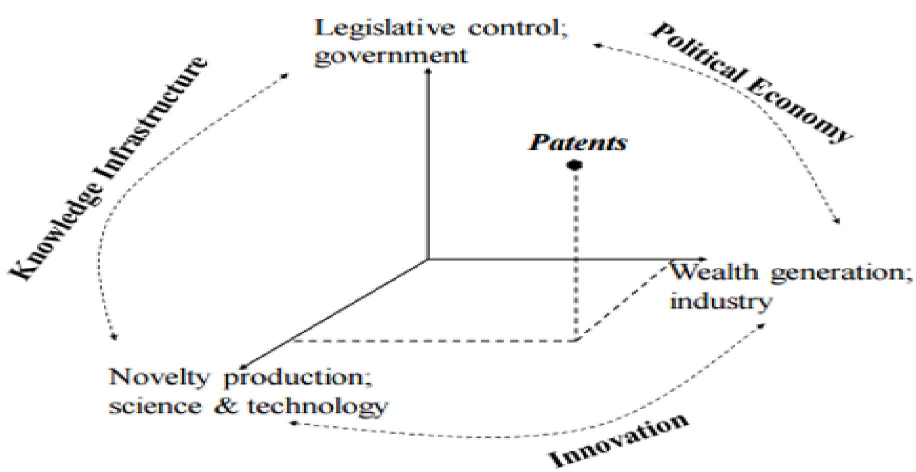


Figure 2.3: The Triple Helix model

The universities play a prominent role in creating innovative strategies in a knowledge-based society comprising of industries and the government (Leydesdorff 2012). Secondly, the collaborative relationship of the three players aimed at creating innovative policies stems from their interactions. In this case, the government reduces risks associated with partnership building to harness a robust scientific base. Lastly, apart from executing their leading roles, the players can also engage the position of each other in designing an innovative economy (Razak et al. 2016).

According to the author, the triple helix model is the ideal approach to delivering maximum results regarding the utilization of innovation systems. However, the article does not provide data analysis that assesses the relevance of the method based on the application of others. Moreover, the assumptions of Etzkowitz (2008) illustrate that the model can attain similar results both in the private and public sectors. The previous literature demonstrates that there is a variance in the resource availability in the two fields (Bason 2010). However, the research will utilize the model to describe the benefits associated with the utilization of the Triple Helix Model. Additionally, it will help in the identification of the related metrics of the identified players in the model.

### 2.7.5. The Quadruple Helix Model

The quadruple helix model is a modification of the triple helix, in addition to the linkage of the tertiary institutions and the public authorities to actualize innovations, it incorporates the 'user's aspects in the model. The model tests products and provides their information as raised by discovered needs and the experiences of the citizens (Afuah, 2003). Compilation of the citizens' experience helps in the identification of the general level of technology. As a result, the system of the innovation utilizes information from the population to comprehend the expectations of the consumer population thus facilitating innovation.

According to Anderson Galvão (2017), entrepreneurship is essential in the attainment of the public sector innovation due to their competitive aspect. The sector relies on the feedback from diverse consumer population to guide the innovative processes. Subsequently, the public sector integrates the framework to improve their innovative system.

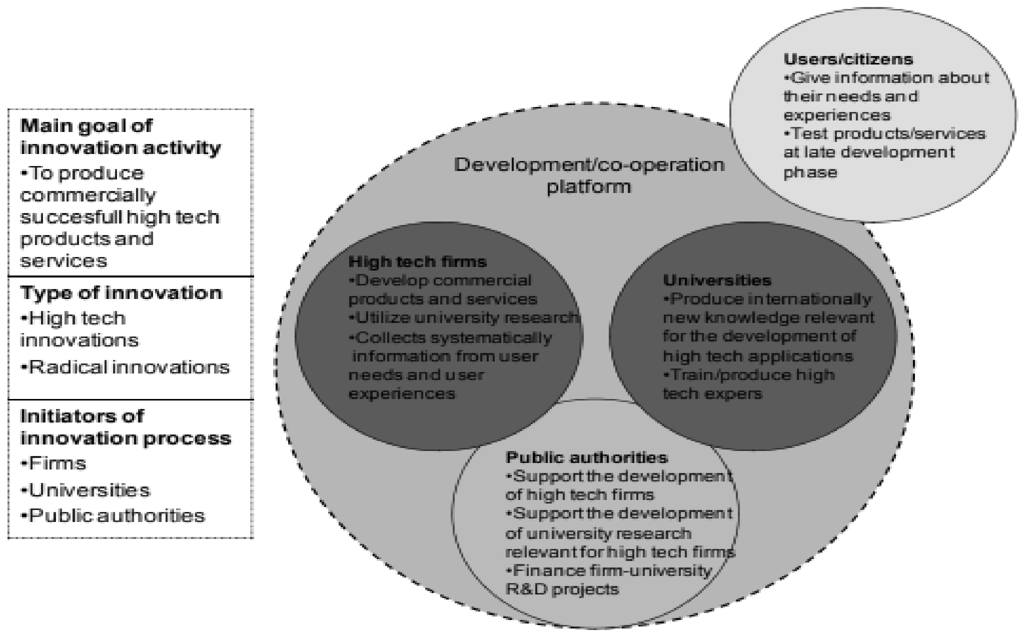


Figure 2.4: The Quadruple Helix Model

### 2.7.6. Multi-facetted Innovative Capacity in Public Sector

Gieske et al. (2016) designed a multi-level innovative capacity framework for the public sector. The levels assessed in this model include individual, organizational, and network levels. The individual level incorporates the capabilities and competencies of employees in the public sector and their relationships. The corporate level designs the fundamental rules, strategies, policies, managerial activities, culture and both intra and inter-organizational structure and behavior. The network level describes the attributes of inter-organizational arrangements, the relationship between various public institutions, and collaboration networks with the entire market players (Gieske et al. 2016, p. 4).

This model engages basic entrepreneurial concepts of combining and connecting various actors, new ideas, knowledge, and sharing risks and resources to create an innovative organization (Joo et al. 2016). The structure has three dimensions that combine the description of the individual, organizational, and network level capacities. They include the connective, ambidextrous, and learning capacities. The connective ability plays a significant role and consists of the provisions and skills that facilitate collaboration. Besides, it fosters the development and maintenance of novel and meaningful connections between organizational content and players. The ambidextrous capacity describes the ability of a public entity to balance continuity and change, exploitation and exploration, and improvement and innovation. The learning capacity shows the strength of the organization to absorb new ideas and knowledge, reflect, experiment, adapt and implement. Figure 2.5 shows how the three dimensions as integrated at the individual, organizational, and network levels of the public sector.

| **Capacity** *Level* | **Connective capacity** | **Ambidextrous capacity** | **Learning capacity** |
|---|---|---|---|
| *Individual* | Linking capabilities: (mainly administrators and politicians)<br>1. Linking of content (idea generation – new combinations)<br>2. Linking of actors within and between organizations<br>3. Establishing and connecting complementary roles | Managing exploration and exploitation processes : (mainly managers)<br>1. Balancing autonomy and experimentation, and control and efficiency, i.e. applying transformative and transactional styles<br>2. Linking innovation process to regular organizational routines | Transformative learning capability: (all actors)<br>1. Reflective attitude<br>2. Tolerant to ambiguity and uncertainty<br>3. Open to diversity of ideas, new knowledge and expertise and contexts |
| *Organization* | Organizational provisions for collaboration:<br>1. Supporting internal networks by socialization and coordination tactics<br>2. Supporting external networks, by improving network skills, assigning roles, supportive policies. | Provision for balancing innovation and improvement:<br>1. Balanced strategies, policies and routines<br>2. Balanced resource allocation | Provisions for organizational learning:<br>1. Support organizational learning processes related to exploration and exploitation<br>2. Support reflection on organizational learning |
| *Network* | Inter-organizational capacity to:<br>1. Create and sustain networks, alliances, cooperative programs, etc, i.e. the *reticulation* of networks<br>2. Create and sustain social capital, by collaborative dialogue, trust-building, and reciprocity | Inter-organizational capacity to establish and maintain:<br>1. Dual structure of networks<br>2. Dual content of networks | Inter-organizational capacity to establish and maintain:<br>1. Collaborative arrangements for learning and experimentation<br>2. Connecting and embedding localized learning with organizational learning processes |

Figure 2.5: Innovative Capacity in the Public Sector

### 2.7.7. Organizational and Economic Implications

Afuah (2003) in his book explained two types of innovation; radical and incremental. Radical change has a direct impact on the market and economic activities of a firm. The concept focuses on impacting the innovation rather than the associated novelty. Thus engaged innovation can change the market structure, goods, and render the existing as obsolete. In this sense, the innovation can impact firm's capabilities in which organization can exploit on the new technological and market knowledge supported by the right competencies and availability of the assets, and referred as "organizational view". Incremental innovation show dominance in the market with a discrete process that determines the level of incorporating basic techniques. Innovation can also impact a firm's profitability by introducing lower cost products and featuring better or new technology, as presented in the Afuah (2003) model of organizational and economic implications (figure 2.6).

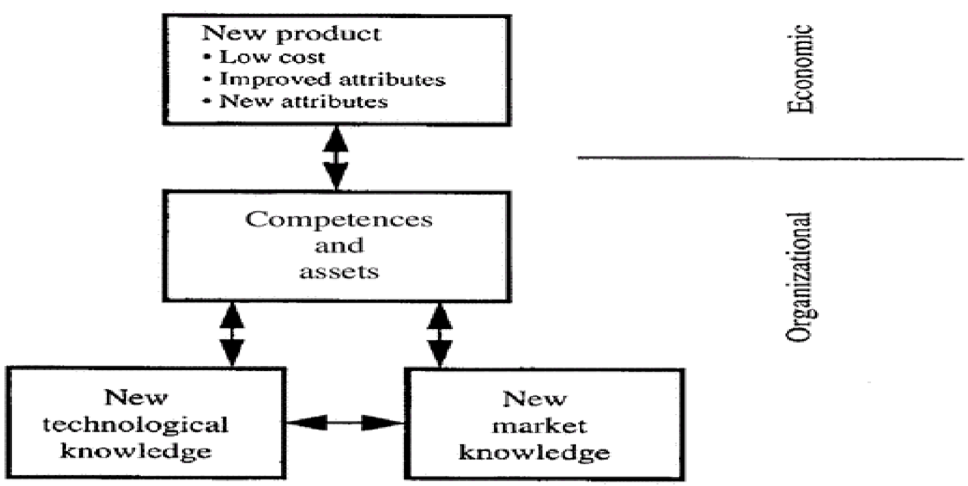


Figure 2.6: Innovation Organisational and Economic Implications

## 2.8. Measuring Innovation Performance

Innovation indicators have evolved over the years, with categorizing them into four generations, each of which becomes progressively complex and meaningful (Gamal 2011). The first generation is referred to as input indicators (1950-1960's) and comprises of measurements of research and development, capital and technology intensity. The second generation referred to as output indicators (1970-1980's) includes the analysis of outputs such as patents, products, and quality changes. The third generation also referred to as innovation indicators (1990's) comprises innovation surveys, benchmarking and indexing. The final fourth generation is also seen as process indicators (the 2000's) and consists of measures of demand, management techniques, knowledge, risks, and returns.

Hansen and Birkinshaw (2007) recommend that as a measure of innovation, it is prudent to view it as a value chain. As such, the concept is a process that occurs in three phases comprising of idea generation as the first, idea development as the next and diffusion as the final phase. For each of these stages, key performance indicators are then established to measure the process along each of the steps from the number of quality ideas generated within each organizational unit at the first phase and the percentage of market penetration in the targeted markets at the last stage. Apart from the level at which the innovation is, Detecon International (2013) proposes innovation measurement at different levels to identify the performance at each segmentation to determine its overall effect on the performance of the entire organization. The levels are a project, program, portfolio, company, industry and the general nation or economy arranged in ascending order. The first level begins with the evaluation of a single innovation initiative and proceeds on until the assessment of a portfolio of innovations and their impact on a given nation's economy.

In a study on how to measure innovation in organizations, Kaplan (2017) noted that most organizations used benchmarked metrics from other companies whose changes have proved successful. The parameters include annual research and development budgets against the company's percentage of annual sales, the total number of active projects, the total number of patents filed in a given year and the total number of ideas submitted by the staff. However, the organization managements argue that such measures provide a limited application with the increasing adoption of open and disruptive innovation. Thus there is a need for newer consideration that will take into account the changes.

As a solution, Kaplan (2017) offers the concept of family metrics. With the need to achieve this, the organization develops a synergy between the innovation's complementary success factors. They introduce three categories of family metrics;

*Return on Investment Metrics*: This measure the organization's resource investments and the gains resulting from these investments. In doing this, the organization will be able to measure the financial value of the innovation and whether as a strategic initiative, it is worth to advance to continual adoption.

*Organizational Capability Metrics*: These measures focus on the process of innovation and the corporate infrastructure that would help to build sustainable, innovative approaches.

*Leadership Metrics*: This evaluates behaviors and attitudes exhibited by an organization's leadership and management geared towards promoting a culture of innovation.

In the above three metrics, input and output scales are used to help evaluate the results. Input metrics involves the resources, investments and behaviors organizations engage in each of the innovative initiatives and the output metrics are the desired outcomes (Chen et al. 2016).

## 2.9. Summary

In summary, the fact that modern economy is becoming more knowledge-based, which poses specific concerns and doubts among the research community regarding the role of innovation as a strategic instance in the organizational success the need for its integration is vital. Though the strategy is at the forefront of creating the knowledge it has undergone a vast challenge from researchers. For instance, Zheng, Yang, and McLean (2010) proved in their study that the organizational strategy possesses a considerable level of importance in the effectiveness beyond the particular context only. Further confirmations assert that managing innovation as a policy has a significant impact on public projects, which implies that even under the resource-based view of a firm, the change needs consideration as a vital component. As consequences, many organizations possess a well-defined strategic process that extends for better and broader idea capture. Though its execution represents the critical challenge to managers it's phenomenal for the public sector to have inclusive metrics of incorporating the innovation. Hence, to avoid execution challenges leading to CEO failure, Moore (2009) advocated tying the strategic theory governing the business to the experience of project management. Without such a close connection, as noted by the author, the project portfolio will remain blind to the need of the business, and the strategic goals of the organization will stagnate without execution-level support.

# 3. CHAPTER THREE: INNOVATION DIFFUSION IN PUBLIC SECTOR

## 3.1. Introduction

This chapter thoroughly reviews the literature on the innovation diffusion theory and enablers in the context of the public sector. The research also defines the innovation diffusion process, identifies skills required to diffuse change at each stage on innovation process. The assessment also has a basis on the important five stages innovation mandatory for complete diffusion of the innovation process.

## 3.2. Innovations Diffusion Theory

Distribution of Innovations theory was improved by Rogers in 1962. Its primary focus is the spread of innovative ideas within a system which in our case is a business (Rogers 1962). It defines a change in service delivery, concepts, methods, and product as a result of evolution to fit the needs of the market and individuals. People don't change, but products do (Les Robinson 2009). Diffusion is thus the process of the spread of the innovation to the people in a system with time (Rogers 2003). Thereby it is predominantly divided into four elements, as follows:

### 3.2.1. Innovation

The change relates anything that is newly introduced by the social system (Rogers 1983). It consists of an idea, product, service or a practice that comes to the user providing an exceptional and unique use.

### 3.2.2. Communication Systems

The system is vital in the spread of innovation. The aspect links the dissemination of information between groups and individuals. Mass media and interpersonal channel add to examples developed by Rogers (Rogers 2003). Mass media spreads information faster. Interpersonal communication, on the other hand, it's slower but most useful for spreading of innovation. The one-on-one contact ensures conceptualization of knowledge thus creates the personal appeal.

### 3.2.3. Time

Time gets rated between the periods of actualization of change to the time it's fully integrated. It, therefore, estimates the speed of spread of the innovation diffusion.

### 3.2.4. Social System

A social system is a group of related units and people with the same problem that they seek to solve jointly (Rogers 2003). The system determines the usefulness of innovation by accepting or denying it. Once approved, they are involved in sharing it with other systems. Different people within the system have different speed of adoption of the innovation. They end up divided into five adopter groups (Kaasinen 2005).

### 3.2.5. Technology Adoption Cycle

Innovators are the risk takers, quick to actors and adapt to change through innovation. As shown in figure 4.3, adopters go through a process of identification of the new innovation and examination if it improves the fundamental components to deserve energy before they adopt an innovation. Early Adopters are the first to accept, embrace, and maintain the position through regular innovation evaluation. However, Early Majority depends on information to moot and adopt changes. The last two include the Late Majority and the Laggards that rely primarily on peer pressure to foster innovation.

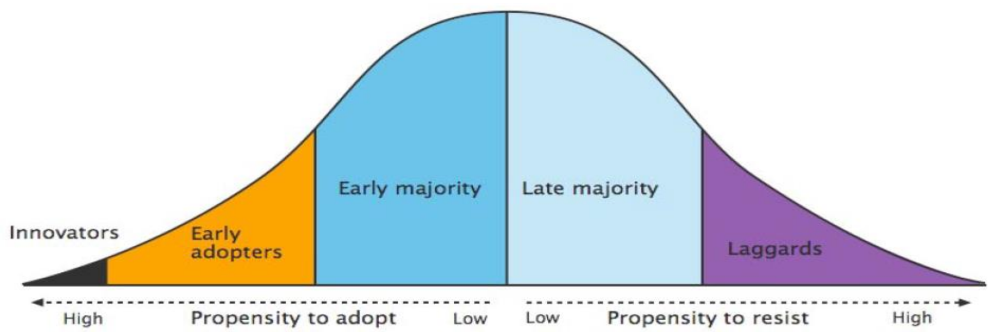


Figure 4.1: Technology Adaption Cycle (Les Robinson 2009)

The innovation has observability, complexity, compatibility and having relative advantage traits. In the adoption of the modernization, five series of stages complete the process as suggested by Les Robinson (2009). These include the awareness stage, interest stage, the evaluation stage, the trial stage and finally the adoption stage.

### 3.2.6. Assumptions

Innovation sparks from the external environment of the company. Therefore, adequate and working communication embraced systems ensure the spread of innovation across the business structure. Interpersonal communication is the best method to share innovative ideas. Without this then a need emerges for a vigorous adoption cycle. Also its decision to have external contact between the employees and other people. With this contact, then there is a quick spreading of innovation information. Management, on the other hand, needs to take an active role in innovation absorption. They should be among the early adopters to reap benefits of adopted techniques and be ahead in the competitive market. Efforts to ensure rapid adoption would include the presence of resource to implement the innovation in time. Working towards transition within the firm after the confirmation of change is also the role of the administration.

## 3.3. Innovation Enablers in Public Sector

Innovation acts as a potential solution to all issues not only in private sectors; but also a source of success across the public industries. Despite many obstacles posed by the public services processes, management continues to find new ways to bring innovation to fruition and create public value. The new techniques have grown immensely and reached out to the social communities demands, it also appeals to emotions of policymakers, and they tend to pay more attention to the leaders who can get innovation off the ground to provide quality public services and better response to society's needs (Bason 2010). The open innovation also faces a wide range of challenges with solution meant to stem from the ability to change and create inventive methods across the system.

De Vries et al. (2014) conducted a systematic literature review of 181 books and articles on public sector innovation, published between 1990 and 2014. The authors concluded that most publications defined innovation based on the Rogers (2003) which states it as “an idea, practice, or object that is perceived as new by an individuals or another unit of adaption” Rogers (2003, p. 12). However, as many publications provided a general definition of innovation in the public sector; the words novelty and first adaption of an idea were the two main dimension appeared in the definition. Thus, De Vries et al. (2014) classified innovation in the public sector into four types, as explained in the following table:

Table 3.1: Types of innovation in the public sector

| Innovation Type | Focus | Example |
|---|---|---|
| Process Innovation | Improving process quality and efficiency<br>• Administrative: applying new management techniques or new organizational form<br>• Technological: introducing new technology | • One-Stop-Shop<br>• Smart government services |
| Product or Service Innovation | Providing new public services or products | Benefits for youth and disabilities |
| Governance Innovation | Development of a new process to address the specific social problem | Enhancing human resource low for government employees |
| Conceptual Innovation | Introducing new concepts or paradigms to reframe particular problems and solutions | microcredit or distance learning an example of social purposes innovation |

Practical, innovative efforts in the public sector depend on the organizational culture; as reported by Green et al. (2014). The approach implies that designing creative public entities demands strong management and leadership across the diverse corporate culture, competencies, and internal processes. Green et al. (2014, p. 4) view public entities as institutions mandated to design and implement various policies, and thus there operations need different sophisticated and non-market relationships. According to Considine et al. (2009), the complex of the relationships implies that the competency to facilitate innovation in public organizations has large distribution across the various field of knowledge and organizations. Thus the concept calls for greater interaction and collaboration among and between units as part of the business alliances, innovation systems, networks, and knowledge ecosystems. On the other hand, Hall and Holt (2008) posit that the organizations need to have an evolved culture to offer reliable services to the public while minimizing risks. The culture should support staff empowerment, encouragement of creative and innovative ideas, and tolerance to mistakes and risk-taking (Cunningham and Karakasido 2009).

According to Halvorsen et al. (2005), innovation in the public sector involves significant uncertainties which do not require rigid budgets and timelines and also top-down planning structures. The most vital aspect of the advancement entails effective implementation regarding seeking, securing, and sustaining the innovation in these entities (Clark et al. 2008). Though public organizations depend on human capital, organizational capital, and external links also facilitates the change of strategies. Innovative policies in this sector are justifiable when they improve the value of the public through enhanced efficiency, service performance, and governance (Boyle and Harris 2009).

In his research on public sector innovation, Reid (2011) identifies five categories of enablers of innovation in the public sector;

- Leadership Strength
- Strategic focus on innovation
- Creativity and design
- Emphasis on learning
- Healthy workplaces and teams that click and implement successfully.

The leadership elements emphasized strong and intelligent, with the ability to empower the rest of the staff to become more creative and innovative. Teamwork consideration as essential satisfied the aspect that it enables each of the team members to build on the strengths, creative ideas, and energy of the rest of the colleagues. Culture is however identified as an overarching success factor to any innovative strategy. According to Amabile (1996), creating a culture of innovation within an individual, a group or an organization is key to the promotion of innovation.

When the behaviors and values of organizations incline creativity and innovation, new ideas are likely to be identified, evaluated and implemented regularly. The effect of the various enablers is documented in a study by Bossink (2004) that combines over twenty facilitators. Eight of these were identified to have negative impacts on the innovation process in case they not fulfilled and included knowledge, human resources, collaboration and time. Three were determined to have a positive influence on the innovation process and are collaboration, the particular mindset, and dedication. Similarly, their importance varied depending on the stage of the innovation diffusion. The method also varies with commitment and mindset applied to be most important during the first stage as well as culture and climate treated as vital across other phases of the process.

## 3.4. Stages and Skills of Innovation Diffusion Process

Various authors have developed different frameworks to describe the multiple steps of innovation diffusion undergoes. For instance, Desouza et al. (2009) describe eight stages-idea generation, mobilization, advocacy, screening, experimentation, commercialization and spread, and implementation. Unlike that proposed by Rogers (2003), this process is cyclic, and all the generated ideas go through the whole innovation process before they are implemented. Hua and Chan (2013) on his part describes six innovation diffusion stages; acquisition, decision, assimilation, transformation, exploitation, and confirmation. According to the author, the process starts with the addition of external knowledge and ends up with a finalized decision to promote the application of innovation during confirmation. Kim (2001) proposes five stages-agenda that include the setting stage where an organizational problem that requires a solution is identified, matching phase to identify innovative initiative that could be a solution to the problem. Further, the redefining/restructuring stage where the innovation is restructured to fit the organization and to clarify the uncertainties, illuminating frame where the side effects of the innovation are determined, and the routinizing stage where the decision made determines whether to terminate the innovation or diffuse it to other departments or organizations.

Rogers (2003) describes five stages of the innovation-diffusion process:

- Knowledge
- Persuasion
- Decision
- Implementation
- Confirmation

His model of the stages is linear and each stage occurs after the completion of the immediate one in a time-ordered fashion (Sahin 2006). Cooper and Zmud (1990) categorize these five into two stages:

- Initial adoption stage
- Actual implementation stage

In initial adoption, the focus is on innovation diffusion at the organizational level and is divided into three sub-categories; knowledge awareness of the novelty, persuasion towards adopting the innovation and final adoption of the decision. The actual implementation stage focuses on the adoption of innovation and its diffusion by either an individual or a group and consist of two sub-processes the innovation implementation and confirmation. However, Carlopio (1998) adapts this model and proposes five innovation diffusion stages:

- Knowledge awareness
- Facilitating structure
- Persuasion, decision, and commitment
- Fine tuning and refining and finally

- Confirmation and re-utilization of the innovation.

For this paper, five initial stages end up used as the basis of the discussion.

### 3.4.1. Knowledge

The concept marks the first stage in which the existence of the innovation ends up reviewing its application. According to Rogers (2003), an individual discovers the actuality of a change and thus tries to find further information about it. In seeking more about the discoveries, the individuals target three kinds of information; awareness knowledge, how-to-knowledge and principles knowledge.

*Awareness knowledge*: This is knowledge covers the actuality of an innovation. The aspect marks the first kind of experience that spurs an individual to find out more about that innovation and thus, be encouraged to create interest in the following two types of knowledge.

*How-to-knowledge*: The approach under this sub-stage considers information related to the usage of innovation. According to Spotts (1999), the concept is the most fundamental knowledge in the decision-making process as it determines the adoption or rejection of an innovation. When an individual has sufficient knowledge about how an innovation works, they will be more inclined to adopt that top discovery in the market (Braak 2001).

*Principles Knowledge*: This knowledge comprises the functioning principles of innovation that describe how and why correctly it works.

However, this stage alone is not sufficient to convince an individual to adopt an innovation. The outcome is because even though one may have all the relevant knowledge regarding an innovation, their attitude and perception may promote or hinder the adoption.

The outcome of this stage is new identified ideas and to facilitate it; one requires skills that enhance the identification and filtering of innovative ideas. Essential requirement among this is the ability to scan the environment for such purposes as well as to evaluate identified ideas. Having a keen eye for activities or processes that can generate value for the individual, group or organization is vital at this stage as information can only address an already identified idea. Creativity is imperative, be it on categorizing new ideas or devising ways to resolve already existing challenges. Curiosity for new ideas should, therefore, be encouraged as supported by Graham-Leviss (2016) asserts that innovative employees always have an underlying desire to learn more about a given design. If in a management position, an individual need to support skills in order to motivate other employees' creativity and bring forth their new thoughts. Employees need to grow aggressiveness as risk takers and show resilient regardless of the challenges facing them or the organization at the moment.

#### 3.4.2. Persuasion Stage

This stage concerns the shaping of a favorable or disapproving attitude about the innovation in question. Since the individual has acquired information about the innovation and how it works in the knowledge stage, one is now persuaded to develop a negative or positive attitude towards it to either lead to its adoption or rejection. At this point, the individual needs to develop sufficient interest in the innovation and therefore seeks out more information about it to inform their decision. According to Rogers (2003), this stage is more effective centered as it seeks to appeal to one's feelings. As a result, social reinforcement from family members, work colleagues, and peers affect one's opinions, coupled with the uncertainty about the functioning of the innovation. Thus, when an individual peers' subjective opinions are favorable towards that innovation, one can be convinced to let go of the numerous uncertainties regarding the novelty and consider it a promising venture.

The outcomes of this stage is an individual's buy-in on the innovation. Relationship skills serve as a key impression that an individual need to learn the attribute of building and maintaining relationships both within and out of their circles. Since such relationships provide insights on experiences with similar and different innovations, it's treated as a basis for one's decision to either adopt or reject an innovation.

Analytical skills are also crucial at this stage. Since the idea needs evaluation in regards with the information gathered about it, and the experiences of peers, family members or friends, logical skills will come in handy in determining what is to be considered essential and what has to be disregarded, regardless of the authenticity of the source. Specifically, to team leaders, a collaborative inquiry is a crucial skill. According to Horth and Buchner (2015), an innovative leader must encourage productive dialogue among the employees by supporting and embracing diverse opinions regarding the issues on the table. All ideas regardless of their feasibility or the hierarchical level of the employee that proposes them should have equal consideration before their rejection or adoption.

### 3.4.3. Decision Stage

In this stage, the choice to either adopt or reject the identified innovation. The most easily taken changes include those with a trial basis as an individual can try it out before actually selecting it for the intended purpose. Various criteria such as the goals and values for which the chosen innovation applies help in the decision process. Rogers (2003) describes two types of rejection that could occur at this stage; for active and passive denial. In the first type, a person tries out the innovation with the hope of adopting it, but after trial, he/she chooses not to take it while in the second type, the person does not consider adopting the innovation whatsoever and instead rejects it right from the start.

However, according to Wejnert (2002), the order of the first three stages can sometimes be knowledge-decision-persuasion as opposed to knowledge-persuasion-decision. The concern is especially true for cultures in the Eastern countries where the resolution attracts approval before the group influence is used to transform an innovative decision at a personal level to an advanced choice at a collective stage.

The assumption at this stage is that the individuals engage in a mental evaluation of the innovation. However, the chances of adoption of a given revolution are usually higher when the innovation has strong benefits over its alternatives, making it triable with the outcomes observed before actual adoption, is not too complex and therefore will be easy to implement.

The outcome of this stage is either the adoption or rejection of an innovation. The skills required at this stage mostly involve the evaluation of the identified ideas. Risk assessment is a crucial concept since the new plan has associated risks that should be recognized at the inception and strategies to mitigate their effect. Diligence, especially during the advantage and limitations analysis, is required, so that likely threat that could emerge from the application of the innovation gets identified early enough, and strategies for controlling and managing them identified (Centre for Business Innovation 2017). One must also be open to new ideas so as not to decide against innovation from it being a new initiative.

Personalization is another skill that enables one to draw upon own experiences as a way of acquiring a novel point of view regarding the innovative initiative in question. According to Page (2015), it is insufficient to use peer opinions to determine the viability of an effort but also tap into one's past experiences to learn what works or fails.

Whether a leader or an employee, one needs to show proactive sense. The art of being innovative covers the capability to examine and seize new opportunities when they arise and be flexible enough to enable quick tapping of the change directions to exploit the new possibilities (Autor 2015).

### 3.4.4. Implementation Stage

The stage marks the first step where the chosen innovation has first execution. The aspect does not guarantee that the uncertainty regarding the innovation has been resolved, instead, it is considered as a serious problem that sometimes requires the technical assistance of change agents. Another sub-process renovation is most likely to occur at this stage. The concept of renovation shows the level to which an identified innovation is modified or changed by an individual during its execution to fit better the needs for which it was determined (Hua and Chan 2013). The aspect could occur to augment the flexibility of the innovation, to increase the individual's sense of ownership of the discoveries and to increase the relative advantage associated with its use. However, the renovation has identifiable associated risks such as legal challenges should the change infringe on the protection of another innovation and the improper application resulting in a less effective improvement.

The outcome of this stage is innovation execution. Risk assessment skills are also necessary at this stage in addition to implementation skills such as planning for the initiatives, being tenacious in the application of innovation and accountability for the outcome of the appeal. Whether the individual is the leader of a team, a member or acting as an individual, it is essential that they be accountable for the results achieved at as after full implementation.

Performance measurement is also required for the purpose of establishing metrics to measure the suitability of the project (Centre for Business Innovation 2017). This helps to establish whether the identified innovation can deliver according to the needs for which it was chosen.

Flexibility in the process is required since, during the implementation, it can be discovered that the planned operations are not as had earlier been planned.

Design skills on how to transform the identified ideas into tangible products and processes create part of this stage. Since the plans have identification at the knowledge and persuasion stages, there is a need for these to be converted into tangible variants to support the operations of the organization.

Multi-cultural competency is a prerequisite especially when the implementation is being carried out by a group of persons (Autor 2015). To effectively execute an initiative, the teams have to embrace diversity concerning the ages, professional skills as well as working and thinking styles.

Skills relating to the project management are equally required. It is imperative that the individual identifies how to manage the scope, time and budgets allocated to the implementation to foresee any possible challenges. If in a management position, team management skills need attention, the leader needs to support his team to deliver and empower them to make decisions regarding the progress of the implementation.

### 3.4.5. Scaling-Up Stage

With the decision to adopt the innovation ready, this stage allows the individual to seek support for his/her choice to scale up the innovative idea. Messages, either supportive or against the innovation are both received after the implementation, although at this point the individual mostly considers those in support. With the support acquired, the attitude of the individual helps to determine whether the innovation will be later applied to scaling-up the innovation capacity. According to social psychologists, once an individual has made a difficult decision, the individual will find it psychologically satisfying to draw attention to the right reasons for the conclusion that deviates from the wrong reasons for not scaling-up that innovation (Oetinger 2004). Wejnert (2002) defines discontinuance as a decision to reject a novelty after it had earlier on been adopted, and is considered to be a sub-category of active rejection. The author describes its two types; that is replacement and disenchantment. Replacement discontinuance refers to the denial of an innovation owing to the introduction and adoption for a better change. Disenchantment discontinuance on its part occurs when unanticipated problems arise in the application of the chosen innovation.

The assertion is the most important skill at this stage (Centre for Business Innovation 2017). Since this is the stage that determines whether the execution of the innovation achieved the desired results or not, it is imperative that the individual is assertive in order to be able to clearly identify those ideas that are of value to the individual, group or organization and those that require to be killed in order not to waste resources. Management and coordination are also key since with the decision to adopt an innovation comes the responsibility of ensuring its effective acceptance and application by the relevant stakeholders to make the innovation greater in size.

### 3.4.6. Innovation Diffusion Generic Skills

In the above-developed stages, generic skills do apply at each point of execution. The ability to coordinate the innovative activities, resolve problems/challenges within teams, create a supportive environment for growth and strong leadership marks key success at each level. Right from the knowledge stage to confirmation of the innovation, strong communication skills required as they help in the initial identification of the innovative ideas and are needed throughout the four other stages to reveal confirmation of the adoption or the discontinuance of the identified innovation. The ability to manage relationships is also essential since such ideas require teamwork to use them from the identification stage to successful implementation. Multi-cultural competency as proposed by (Autor 2015) is a crucial skill during the implementation stage. However, this skill should also apply at all other stages since different workplace results in diverse ideas, viewpoints as well as divergent thinking that would result in innovative initiatives.

In another set of skills, Industry Skills Councils (2009) proposes a framework of six stages of change diffusion. According to the author, to support the innovation diffusion process, an individual need to have skills that interpret the need for innovation. Similarly, generating an idea to fulfill that need, collaborate with other stakeholders on developing the hint, reflect on the viability of the concept, represent the knowledge to others to promote it and evaluate it regarding its usefulness and applicability. Table 3.1 summarizes the findings of the innovation diffusion stages, outcomes, skills, and possible questions to ask about each step:

Table 3.2: Findings of innovation diffusion

| **Innovation Stages** | **Outcomes** | **Skills** | **Questions** | **References** |
|---|---|---|---|---|
| Stage 1: Knowledge | New Ideas | • Creativity<br>• Idea Evaluation<br>• Curiosity<br>• A keen eye for opportunities<br>• Problem-solving<br>• Teamwork<br>• Communication<br>• Multi-cultural Competency | Q1: What innovative ideas exist?<br>Q2: What is the innovation? | (Rogers 2003)<br>(Graham-Leviss, 2016) |
| Stage 2: Persuasion | Individual buy-in on the innovation | • Relationship Skills<br>• Evaluation Skills<br>• Collaborative Inquiry<br>• Teamwork<br>• Problem Solving<br>• Communication<br>• Multi-cultural Competency | Q1: How does the innovation work?<br>Q2: What are the opinions/attitudes of those who have used it before? | (Gamal 2011)<br>(Horth & Buchner 2015) |

| | | | | |
|---|---|---|---|---|
| Stage 3: Decision | An accepted or rejected innovation | • Risk assessment<br>• Diligence<br>• Openness to new ideas<br>• Proactive<br>• Flexibility<br>• Personalization<br>• Teamwork<br>• Problem Solving<br>• Communication<br>• Multi-cultural Competency | Q1: What are the advantages and limitations that could arise from the adoption of the innovation?<br>Q2: Does the innovation fit the values and goals of the organization? | (Gamal 2011)<br>(Autor 2015)<br>(Page 2015) |
| Stage 4: Implementation | Innovation execution | • Time, scope and cost management<br>• Flexibility<br>• Relationship- Building<br>• Accountability<br>• Performance Measurement<br>• Design<br>• Tenacity<br>• Multi-cultural Competency<br>• Coordination<br>• Teamwork<br>• Problem Solving<br>• Communication | Q1: How useful is the innovation to the needs of adoption?<br>Q2: what is the best approach to implement this innovation? | (Spotts 1999)<br>(Autor 2015) |
| Stage 5: Scaling-up | New Innovation | • Assertion<br>• Coordination<br>• Management<br>• Teamwork<br>• Problem Solving<br>• Communication<br>• Multi-cultural Competency | Q1: Are other relevant stakeholders in support of this innovation?<br>Q2: Is the innovation applicable to other functions/firms? | (Wejnert 2002)<br>(Centre for Business Innovation 2017) |

## 3.5. Summary

In conclusion, the outputs of innovation are unpredictable. Despite its inputs being easy to describe as they always comprise of organizational assets and resources, the outputs from the same create difficulties in characterizing when the innovation process is yet to complete. The differentials have attribution to the fact that innovation is a non-linear and complicated process (Hollanders and Cruysen 2009). When complete, the outcomes of change include shareholder value, customer and market, workplace premiums along the organization's value chain. In creating value for the organization, innovations result in increased customer loyalty, better employee retention, more shareholder returns and better competitive market positioning for the organization.

# 4. CHAPTER FOUR: PUBLIC SECTOR INNOVATION IN THE UAE

## 4.1. Introduction

This chapter presents the UAE public sector innovation practices and highlights on the primary focus of the country's National Innovation Strategy launched by UAE Ministry of Cabinet Affairs in 2015 that will drive future innovation in the country. The chapter also explores how UAE embedded the culture of innovation amongst individuals, companies, and governments.

## 4.2. UAE as a Hub for Creativity and Innovation

The economic revolution in the Arab countries stemmed from their declaration to deviate from relying on oil revenues to steer their countries. The realization and dedication triggered the diversion of investment in different economic activities to enhance the stability of the regions  The United Arab Emirates is one of the areas that devotes most of its resources to the development of alternative sources of revenue (Agolla and Lill, 2013). In the past three decades, the country has reviewed resources in several sectors including, transport, tourism, construction, and technology to reduce their reliance on oil as the chief source of revenue. The exploration of various industries necessitated the integration of innovation to ensure they remain at par with the current technologies. Additionally, it provided the country with a competitive edge over the global leaders in their different new sectors of investment.

Since the country declared to pursue a different strategy regarding the provision of its revenue, it has portrayed resilience that has earned the title 'hub for creativity and innovation' in the Middle East. Support from the UAE administration that believes will protect the investment, and the stability of the country has promoted the development of firm innovative models. For instance, the vision 2022 of the state aspires to utilize innovation policies and creativity to devise appropriate economic and technological strategies (Martinsuo et al. 2006). The relevance of the county is not only present in the private sector but also dominant in the public division. The government focuses on the utilization of expatriate service to improve the efficacy of service delivery in the community. As a result, they rely on the national innovation systems that have attained success in different countries in achieving the same in the U.A.E.

In 2013, UAE Prime Minister, Sheikh Mohammed bin Rashid Al Maktoum stated in the government summit that, “we want to relocate citizen service centers into every public device, enabling them to obtain the desired service through their mobile phones anywhere at any time”. A successful government reaches out to the citizens rather than waits for them to come to it. The statement reveals the intention of the government on the reform of the public service. Unlike a majority of the public administrations that focuses on cutting costs and surviving, the UAE aims at competing with the successful private organizations in the provision of service. Additionally, Hessa, Margaux, and Jörg (2016) in the article, ‘How the UAE government modernized citizen services,' illustrates precisely how the provision of public service is dependent on the demographics of a region.

Moreover, the authors reveal that the diversity and age of the majority of the population necessitate innovation. The youth and the expatriates need to interact with the latest trends due to their appetite for ‘new’ methods. As a result, the government has a mandate of ensuring they deliver appropriately for the majority of its youth to remain satisfied with the level of service. The article reveals that the population of the UAE necessitates the utilization of effective innovation systems in the country (Marxt & Brunner 2013, p. 1040). The assertion is accurate because the local youth and diverse cultural population need a different platform for engagement. Utilization of the traditional system will serve as a hindrance to the attainment of successful interaction. As a result, the leadership commitment and the demand of the population promote the implementation of flowing national innovations systems.

The pipeline projects in the UAE including the smart tourism and cities agenda portray the dedication and desire of the region about social innovations. The Observatory of Public Sector Innovation (OPSI) of OECD (2014) reported that the absence of regular units of measuring the technology and innovation development serves as a detriment in the attainment of consensus. It complicates the evaluation process of the various programs underway in the region. Nonetheless, the absence of a uniform system will lead to ‘academic' analysis of progress based on the different metrics thus hampering continuous growth and development. The report recommended the development of consistent measurement units to assess their progress and inform appropriate action and reaction (Buhumaid, Constantin, and Schubert, 2016). The literature reveals that despite the UAE direction regarding public sector innovation, evaluation of progress is a problem. Provided the countries lack of sufficient mechanism of assessing the penetration and the success levels of their programs, they are likely to fail. The article is fundamental to the context of the UAE because it sheds light on the challenges that the region faces on the innovation systems aspect. The research intends to utilize the information to compare the different measurement techniques exhibited in the area. Subsequently, the development of a robust and inclusive method will ensure the re-alignment of the difference and help in attaining an ideal assessment unit. Notably, the analysis of the influence of the conventional technology systems will provide better feedback to the public sector leadership.

## 4.3. Stimulating Environment for Innovation

The United Arab Emirates inception has created full recognition of the country as a hub for creativity and innovation. Since UAE government believes that change is the future of investment, its significance across all the sectors has won attention through the inclusion of innovation in 2021 vision that seeks to have innovation as a core pillar of its economy, alongside research, innovation, science, and technology. The country is ranked first among other countries in North Africa and the Middle East for its performance in the 2014 Global Innovation Index. As a result, the UAE in 2014 established a National Innovative Strategy referred to as the UAE National Innovation Strategy that stems from three pillars (United Arab Emirates 2016);

- Creation of an environment that enables innovation
- Innovation priority sectors
- Innovation Champions

**An Innovative enabling environment**: The strategy focuses on the nature of the right environment to facilitate innovation as a method of ensuring that the change initiatives succeed. The approach seeks to establish an innovation regulatory framework, enhancement of the technology infrastructure, provision of enabling services and providing investments and incentives are made available.

**Innovation Priority Sectors:** Since the main aim of the national innovation strategy is to promote innovation, priority sectors targets to lead this in seven departments at the domestic level-renewable energy, technology, health, transportation, education, space, and water. For each of these sectors, the strategy intends to promote novelty through various sector-related initiatives with the aim of developing a wholly innovative industry (Ministry of Cabinet Affairs, 2015).

**Innovation Champions:** The strategy proposals also recognize individuals, organizations and government sectors that embrace innovative culture as the inventive critical champions. With the need for establishing innovative individuals, the strategy develops mechanisms for the recognition and sponsorship of creative individuals. Notably, at an early age from the collaboration of schools and universities with global academic institutions the empowerment of individuals with the aim of embracing a culture of innovation and creativity end up promoted. At workplaces, the policy emphasizes a shift towards multi-cultural teams to share experiences and knowledge for stronger innovation skills. On companies, the strategy aims to promote innovation, especially among small and medium enterprises. The plan also strives to build innovation and scientific research centers, launch a corporate innovation award system and implement cutting-edge technologies. On an innovative government, the strategy emphasizes the need to instill a flexible culture in all state-owned entities. The reason behind the initiatives is to ensure the United Arab Emirates one of the most significant global innovation hubs through providing all the government entities have one percent of their budgetary allocations set aside for innovation initiatives (Ministry of Cabinet Affairs, 2015).

With the need to implement each of these in the various industries, the National Innovation Strategy proposes different relevant approaches for the defined sections. From the decentralized energy generation in the renewable sector, the authority seeks to commission the use of solar energy in the purification, production, and desalination of water in the water industry. Models such as the introduction of new initiatives, the innovation funnel, and the innovation lab have their utilization interchanged across the various sectors depending on the type of change implementation needed for each segment. Importantly, the strategy at introducing legislation that has immense help in promoting innovation incubators, motivate both the public and private sector towards innovation, foster international research partnerships and enhance national functional capacities.

## 4.4. Innovation Diffusion Practices in UAE Public Sector

The strategic formulation process of change depends on set redefining measures for the business model and the value attached to the innovation. Restructuring business layouts entail embracing innovation which disrupts the previous working systems (Markide and Oyon 2010; Charitou and Markides 2003). Therefore, innovation creates the need for an integrated business model to always have room for new changes. Management also needs a shift of mindset to accommodate strategic innovation frequently (Govindarajan and Trimble 2004). With the urgent need to acquire a constant innovation base, all staff must undergo deliberate learning. The consideration increases the knowledge aspect and introduces concepts of appreciating the value of innovation. Education creates ease of managing the disruption with knowledge absorption through assimilation becoming possible. Further, theoretical analysis shows the need for management to take a steward position and induce innovation.

A close review of local practices based on the framework published by General Secretariat of the Executive Council for the Abu Dhabi Excellence Award in Government Performance – 5th Cycle has a dedicated pillar for innovation that accounts for the 10% of the overall rating of the structure. Local entities should focus on two main criteria: Future shaping and Innovation Management. The extent to which both tests applies depends on the nature of the work of the governmental body through looking ahead and determining the essential elements of ambiguity in their external environment and effect they have on the job. Those criteria also focus on how innovative solutions are leading to developed pioneer initiatives in the field of services, processes, and programs that apply to ensure that all strategic objective meets the highest level of services provided to customers (ADEAGP 2017). Federal and Dubai local entities deploy government innovation framework published by Mohammed bin Rashid Center for Government Innovation. The structure encourages the two bodies to believe in the innovation as an everyday practice and lead them through the vision of being among the most inventive governments in the world. Thus entities should perceive this framework by experimenting with new approaches, enabling people with the right capabilities, networks, and resources, thereby enriching the organizational culture of innovation (MBRCGI 2015).

The concept of developing cutting-edge innovation strategy is not the ultimate goal of the government. The fact remains that, measuring and evaluating the change impact is the launching point for demonstrating the value of innovation projects. Therefore, public sector entities are stimulated through government excellence award to contribute in achieving national innovation KPIs. The excellence can be accomplished by setting a clear action plan for the change, apply flexible work environment and build confidence in the effectiveness of the innovation as it develops throughout the different stages of innovation diffusion. According to MBRCGI (2015, p. 56) government entities should focus on five success criteria to measure innovation projects; as follows:

- **Novelty:** the degree to which the innovation has demonstrated a leap in creativity.
- **Effectiveness:** the degree to which the innovation has achieved tangible results.
- **Transferability:** the degree to which the innovation, or aspects of it, has shown promise of being spread or replicated by other government entities.
- **Significance:** the degree to which the innovation has successfully addressed an important problem of public concern in the government sector.
- **Value:** the degree to which the innovation has added value, saved costs or generated new revenues.

## 4.5. Summary

This chapter emerged the aspects of the economic revolution in the context of UAE public sector and the realization of new priority sectors. As more focus goes to innovative public services delivery, the UAE government and leadership governed such process with newly introduced national innovation strategy. The issued policy will drive the future of innovation in the country and will facilitate technology advancement in public sector services to the citizens.

# 5. CHAPTER FIVE: CONCEPTUAL FRAMEWORK

## 5.1. Introduction

This chapter presents an in-depth review of the literature on the primary research constructs, a proposed a conceptual framework for the study and formulates research sub-hypotheses. It explores constructs within the public sectors that have an extensive link with innovation and delivery of essential services in the society. The chapter also connects aims, objective and reviewed outcomes in the previously discussed sections.

## 5.2. Proposed Research Conceptual Framework

The volatile environment across the world has forced governments to intervene and scale their approach on innovation to improve service delivery in the public sector. Ecosystems in the general divisions have initiated plans and policies to accommodate new ideas that enhance organizational efforts. Importantly, the schematic concept linking innovation practices, stages and skills, and potential outcomes relies on public stakeholders' capability to bond the creative process to the target goals. The public sector innovation acts as a process in which newly developed ideas under innovation practice become potential outcomes that create value in the society. The elements of construct initiated on innovation strategy depend on the deployed methods and the anticipated possible results.

Under the conceptual research framework in this study (see figure 5.1), programs and projects operated by the public organizations create an avenue of integrating skills to achieve social, economic, and public service for the potential outcomes. The innovative practices are exclusively direct to the success of the new idea and thus attributed to important strategies that the public sector develops. The formative stages integrating practice and outcomes have more interest in projects, program, portfolio, policy, and government's council objectives that target to enhance the value of social services. While considering the public sector innovation model, the five innovative practice have the strength of sourcing the unlimited workforce from the society and use the technological platforms to sharpen their skills. Besides, the process model reviews the resourcefulness and management skills that public officers have to develop practical strategies that consider different levels of skills for a particular outcome.

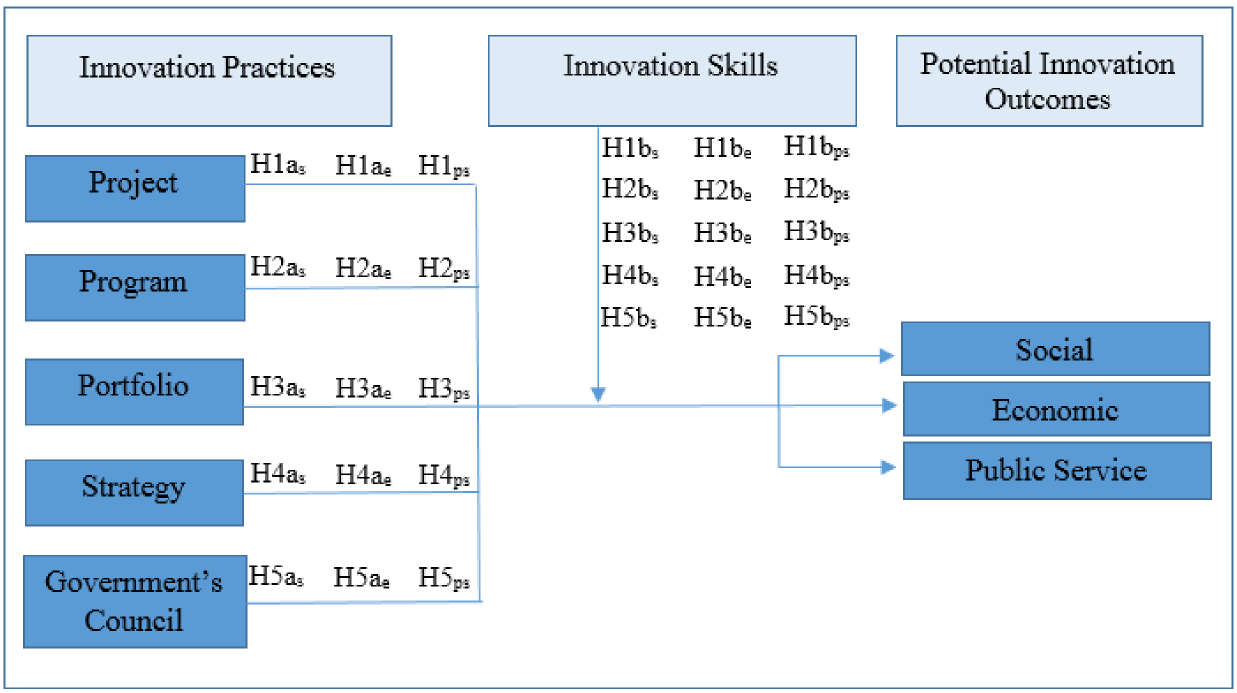


Figure 5.1: Research Conceptual Framework

The above conceptual framework shows that innovation practices including the project, program, portfolio, strategy and government's council targets to influence the outcomes in the social, economic or public service domain. Besides, every single innovation practice depicted above has a capability of affecting all the three potential issues. If a project succeeds in its foundation, the incorporated techniques can change the society, enhance the economy, and improve public service delivery. Similarly, innovation skills or stages in a project-based organization bridge the concepts of innovative practice to give an outcome that reflects a general improvement on public service delivery. The potential innovation outcomes based on the three levels rely on the promptness of human knowledge to integrate innovative skills that result in a well-defined and deliver public services. However, as a measure of diffusion innovation skills determines the kind of practice and its successive potential outcome either socially or economically.

## 5.3. Hypotheses Development

The study creates a critical assumption of an existing relationship between the innovation practices levels; including the projects, program, portfolio, strategy, and government council with the potential innovation outcomes in the social, economic and public service perspective. Further, the null hypothesis in this study develops a supposition that correlation between the innovation stages skills; including knowledge, persuasion, decision, implementation, and scaling up rely on the potential innovation outcomes. In an article by Nuttaneeya and Arundel (2016) “Complexity of Innovation in the Public Sector: A Workgroup-Level Analysis of Related Factors and Outcomes” the author assert that innovative approach in public undergoes complex operational experience. The aspect at each of the public subsection requires connection to the primary source of a creative idea to ensure that the targeted outcomes reflect uniformity.

The association and influence aspect asserts that ideas and experiences in two correlated things enforce each other to enhance their relevance. According to Hartley (2013), the associative hypothesis forms conditioning between two concepts to modify stimuli that achieve a particular outcome. An input or specific practice is assumed to reinforce the expected result within the range for which an idea was initiated and expectation from the initiators. Bason (2010) assert that public service innovation relies on modernization practice levels such as well-designed projects to stimulate various human skills and reinforce expected outcomes. The influence effect assumed by the hypothesis is that social, economic and public service improvement will reflect what the first innovation practical approaches purported to achieve in the long-run. Further, innovation skills in the context of the public-based organization, the association and influence effects acts as a stimulus and reinforcement. The aspect stimulates the possible inputs to coordinate and reinforce outcomes to show consistency with the innovation expectations.

The uncertain terms attached to "associated, correlated and influenced" serve as a key part of the analysis process particularly in mediation/moderation relationships. Innovation practices have a close association with the skills that the workforce in the public sector engages. The correlation is hypothesized to link the verified techniques at practice level and influence not only the outcome but the urge to achieve successes (Nuttaneeya & Arundel 2016). The three terms of hypothesis create good relations as there is sharing of many facilities and information. Further, implementation introduces new bottlenecks or opportunities for the public sector. There is an improvement in service provided.

### 5.3.1. The relationship between Innovation Practices at different levels and Potential Innovation Outcomes

The innovation practices have a significant relationship with economic outcomes. It can introduce new ideas in the form of prototypes that sets an economic gain (De Luca 2007). Lessons learned within the innovation process help the companies in strategy development and economic harnessing of profits. The significant innovation that each work-group in the practice section act as a proxy on the set outcomes. Therefore, holding an assumption of correlation the public sector organization has various platforms in the skilled work-groups to achieve the set innovative potential outcomes. The author's assessment on the Australian groups of employees in public sector revealed that with complexity in set innovative requirements, the more it became complex to work together. Notably, where the practical, creative traits have a well-coordinated procedure of application social outcome have a likelihood of being achieved. In the context of public-oriented ventures, the social results include a systematic bonus paid programs, electronic motivational-based structures, and knowledge acquisition training sessions. The outcomes achieved from strategies include improved staff cohesion to adopt innovation and proper coordination of the existing structure to achieve inventive targets.

The public service relationship with the innovation practices relies on shown by the public service growth. With introductions of projects and innovative ideas, there is an improvement or deterioration of parastatals and service provision. Government policy further determines the administrative regulation of public amenities. Some project levels require intergovernmental relationships thus also creates a connection between the project and government policy (Dong et al. 2017).

### 5.3.2. The relationship between Innovation Practices, Skills, and Outcomes

The innovation practices refer to set specific activities that offer a competitive advantage to an organization. The skills avail the induced workforce that manages and executes the set practices to attain innovative goals. Importantly, the outcomes show the final standard results of a particular strategy compared to the actual set limits intended by the organization has whole based on the innovation. The three aspects have a close relationship by relying on a dynamic process to adjust to change in environment and structure of the business. The practice roles lay the decisive background based on the innovative techniques in the market to tap the best and quality skills to the organizations (Buhumaid, Constantin, and Schubert, 2016). The overall outcome relies on the engaged workforce to understand and incorporate innovative structured practices to achieve particular levels of business output.

Participation of the government in the promotion of knowledge-based cues through learning and development in specific institutions creates the public sector understanding of innovation principles. Benefits cultivation is also a best practice achieved together with the developed competencies and needed skills. Nuttaneeya and Arundel (2016) argue that as a linking aspect based on developed null hypothesis, innovation stages and skills advocate for decentralized workgroups on the innovative practices. The functional groupings share a range of skills based on the public service domain and integrate techniques that target to improve services and outcomes. Besides, the research will further investigate the mediator/moderator role by innovation skills concerning the association between innovation practices and outcomes.

### 5.3.3. The Mediation/Moderation Role of Innovation Stages Skills

The mediation effect accounts for relations between stimuli and reinforcing agents in an intended change. The influence ensures conflicting conditions between the requirements remains at minimal levels for smooth outcomes of instituted reforms (Sørensen & Jacob 2016). On the other hand, moderation effect acts as a measure that determines the strength and direction of a deployed relationship between reinforcement and stimulation of particular action. The moderator effect represents an interaction between a principal independent variable and a specific factor that ensures its operations. Notably, the moderation effect influences the strength of the relationship between input and output.

In this context, the moderator effects may act as a creation to promote the spread of ideas in innovation practices, skills, and outcomes. The moderation enhances business designs to provide more realistic and findings in the results (Nuttaneeya & Arundel 2016). The effect is qualitative in that the set variable influence members of the public directly. Thus the public sector size and its financial leverage affect the relationship of invitation and outcomes based innovation adopted. Whereas, the mediation effect could be a correlational variable that connects independent aspects of innovation practices and skills to the dependent variable of potential innovation outcomes. Mediation in the public sector link outcome, a dependent variable and the casual inputs that involve the independent variables. The mediation effect also builds organization culture that is inventive nature. Therefore, any recommendations from this approach promote mitigation of adverse impact of produced goods or offered services. The primary aim of the mediation is to keep adopted novelty practices relevant even when the market conditions create barriers to prevent optimal performance.

This study hypothesized to adopts a mediation effect to create an assumption that innovation practices and outcomes have an indirect relationship. The independent variable in this case which is the innovation practices influence the kind of techniques and skills enforced in the public sector to achieve the desired results. Sørensen and Jacob (2016) add that innovation stages and abilities identifies the primary independent variables in an innovation practice and correlates them directly to a corresponding outcome. The consent of this rationale is that a practical input like program depends on skills mediator to identify the sector to target for a result which is either general society or the economy. The innovation stage and skills connect the most relevant innovated practices to the potential outcomes that have strong positive implication on the success of public sector services. Thus the mediator effect of the creative skills prompts strength input as a variable to influence factors that enhance achieving of the set innovation performance based on cultural orientations which play a critical role in strategic management.

## 5.4. Potential Innovation Outcomes

Innovation is an ever-continuous process in our daily lives. It comes in different eras and sections within the business and therefore also has different outcomes to the environment around the industry. The main result caused by innovation is an improvement in the ways of life and style of doing things. The impacts end up felt in the social, economic and public sections.

### 5.4.1. Social

Innovations direct efforts toward solving problems within the human setting. The consumers are the investable bosses, and every innovation strategy aims at improving the experience of the consumer. The innovation outcomes involve finding the new, and more effective approach to address the social problems of time in the public sector. The main intention in a social setting is to collectively learn what innovation entails in the public sector and scale effort to meet consumers' needs (Yijia and Ting, 2012). Attainment of new strategies and inclusive learning, in any form, creates a social outcome among the stakeholders in the public sector. However, the problem with many social efforts is that organization get struck while devising the appropriate method to integrate innovation techniques. Individuals that define fear as deceiving evidence in public sector find a way of using innovation to create an impression of the mismatch in addressing the social problems. However, coming up with innovation that creates a feeling of hope related to the social issues marks changes that have come about as a result of collaborative efforts.

Innovation further plays a vital role in the employees’ satisfaction in achieving self-actualization. Intellectual gratification is drawn from actualizing a project and coming up with something unique in the public sector. Notably, a sense of well-being comes with a feeling of change initiated within the innovative project. In most cases, innovation acts as a foundation in which profits within a company are realized. With higher profits achieved via new techniques, organizations increase wages and incentives that raise the standards of the living among the employees. Besides, social welfare is an emerging trend impacting innovation integration across the public sector. Garud et al. (2013) state that in the old gone day's environmental degradations and depletion of resources defined the operations of the public owned organizations. The aspect led to low social responsibility with businesses benefiting a few unlike the need to serve the public. The social welfare projects incorporating innovation management creates wealth for the poor and also enhance a suitable environment for human living. Innovation can serve as a catalyst for sustainable development and modernization of society, supported by Veenhoven (2018, P.9) that "The more modern a country, the happier its citizens are". As psychologists utilize notions of happiness and well-being when discussing social welfare (Mitchell et al. 2013), Veenhoven argued that rising wealth in nations does not raise the life contentment among the citizens. However, the economic growth adds more to happiness in developing nations than it does in rich ones.

Innovation is a source of professional and moreover, the unskilled jobs that require natural talent. The stages involved in change are awareness, learning, and implementation. Innovators have got a chance to express their skills to the job market and make their talents known. The implementation stages that requires technical and information know-how also creates employment opportunities. Increase in innovation results in more employment opportunities and the workforce operating in the public sector grows. The aspect that technology captures the skilled, semi-skilled and the unskilled, individuals' living standards and competencies to deliver improves (Hartley, 2013). Table 5.1 presents the potential social outcomes and the mentioned statements developed by the author based on concepts stated in the references.

Table 5.1: Social Statements

| Statements | References |
|---|---|
| Happiness is an important societal quality, as it fosters nation's welfare, wealth accumulation and invention | Yijia and Ting (2012)<br>Garud et al. (2013)<br>Hartley (2013) |
| Happy people are more optimistic, confident, and are willing to navigate untested environments to achieve goals and build sound institutions | |
| Innovation is a crucial factor for ensuring economic growth, competitiveness, and the wellbeing of society | |
| Innovation creates jobs and gives people opportunities to utilize their potential, while being active economic and social players | |
| Innovation leads to the development of talented work force | |

### 5.4.2. Economic

Introduction of new ideas creates a reason to earn income. Innovation covers the needs of the consumer or improves the technicalities of meeting the requirements. Therefore, new business creation reveals a basis for prompt services to consumers to earn revenue. The approach results in incomes for firms, individual and government corporations. For an innovative environment, the wealth created shows a close interaction between the stakeholders such as suppliers, contractors, and employees intentioned to earn spread out results (Meijer 2014).

Innovation enables the company to stay at the top of the competition economically. They can maximize on the consumer perspectives and earn profits from investments. Therefore, innovation creates economic optimization of a company. Bason (2010) suggest that with change, the production cost reduces because the use of new technology and effective methods in daily activities is a norm.

One purpose and niche on innovation involve service delivery. When one creates a platform that improves on this, then it is a delivering plan for all economic needs. The change also covers the whole areas or needs. Ideas crop out from needs that had delays of discovery.

Technology mostly creates a resolution opportunity that was not initially anticipated. With the presence of these needs, there is a new market segment that is created. Venturing here will thus create new business ideas.

Further, innovation on the economic concepts focuses on policies that provide direct support for the set objectives. According to Borins (2014), survival of the public sectors in competitive environment relies on such policies to win the confidence of the society. Thus rather than targeting to provide goods and services, the economic perspective of innovation promotes the creation of job opportunities. Mixed evidence of reduced turnover and amassing of wealth in society emerges. Similarly, the economic approach to change guides selective directives on produced goods, services, and employment opportunities for the community at large. The venturing in society ends up not only generating wealth but also helping members of public realize their potentials in the innovative world. Table 5.2 presents the potential economic outcomes and the mentioned statements developed by the author based on concepts stated in the references.

Table 5.2: Economic Statements

| **Statements** | **References** |
|---|---|
| Innovation leads to the creation of new sources of wealth | Dagilio et al. (2014);<br>Andrew et al. (2009);<br>Olivier (2012);<br>Chen et al. (2016);<br>Meijer (2014);<br>Bason (2010);<br>Borins (2014); |
| Innovation leads to financial optimization | |
| Innovation leads to service performance improvement | |
| Innovation leads to the discovery of the unmet needs of current and future generation | |

### 5.4.3. Public Service

Service improvement base on innovation is fast growing. In health, there are new devices and new care methods deployed on periodical basis that has made the health industry more effective across different sections including diagnosis, treatment, and prevention. Education has also accrued benefits from innovation, especially with technology use. Public service generally has taken a giant step with their service delivery methods owing to new advancements (De Vries, Victor & Lars, 2016).

Employment productivity improves when one's skills and talents have full delivery. This generates a situation of continued growth in skills and knowledge of the employee. This creates employee satisfaction. People look for employment in places where their talents are appreciated and put to use efficiently. Innovation creates a platform for the use of knowledge and skills.

Also, the public sector has taken a new approach to accommodate innovation at the societal level. The latest trends involve the public-private partnership (PPP) that provides innovation in both production and management (Afuah 2003). According to the networks governance and collaborative measures in public domain, change ensures public service benefits from the involved partnership. Other than guaranteeing to direct management and production, the civil service inventions focus on individual innovation skills. The talented and individuals possessing unique talents becomes a potential resource to implement the public service ambitious dream (Sørensen & Jacob 2016). Training and refresher courses in society create an opportunity for individuals to realize their potential pattern with private sectors and improve the public service that directly impacts them. Table 5.3 presents the possible public service outcomes and the mentioned statements developed by the author based on concepts stated in the references.

Table 5.3: Public Service Statements

| **Statements** | **References** |
|---|---|
| Innovation can be instrumental in enhancing products, services and processes in public sector | Dagilio et al. (2014);<br>Andrew et al. (2009);<br>Olivier (2012);<br>Chen et al. (2016); |
| Innovation plays a significant role in encouraging and stimulating service improvement | |

| | |
|---|---|
| Innovative and talented individuals are attracted to places where their talent is recognized, appreciated, and deployed | De Vries, Victor, and Lars, (2016);<br>Afuah (2003);<br>(Sørensen & Jacob 2016). |

## 5.5. Innovation Practices

While steering the firm's innovation processes, there is the need for an important structure that could adequately measure the innovation activities. The overall scope of the company's operations with conventional attributes such as financial returns would not suit as it does not gracefully isolate innovation strategies and their outcomes (Kerssens-van et al. 2004). The main approaches to assess any innovation strategy are goal setting, diagnosis, and steering. The areas covered in the assumed performance strategy include inputs, policies, culture and company structure, innovation process and the outputs and outcomes.

The innovation performance objectives ensure that the public sector achieves increased the utility and effectiveness of the innovative initiatives undertaken (Janssen, 2011). Looking at it from a holistic point of view creative culture gives a vague explanation of the need for measurement. It is however with detailed and in-depth efforts to understand the sub-purposes of innovation that will eventually shed light on how the efforts contribute to the company’s ultimate goal. Innovation performance is applicable in a company for evaluating staff and personnel, and this will determine their incentives such as salary raises and bonuses. Further, it helps to identify the resource allocation in different projects depending on attached effectiveness. All measurements eventually uncover loopholes and situations that took a wrong turn. They are therefore a source of learning and initiators of improvement and correction through reorganization.

Assessed innovation also applies to massive array levels and scope. The approaches can range from a single project up to entire economy level. Besides, most innovation measurements are conducted on the organizational level and often mix up the underlying sole or complete approaches. The standards proposed in this paper are drawn from the existing framework developed by Schentler et al. (2010), and it has been re-ordered to fit the nature of the UAE public sector, see figure 5.2:


Figure 5.2: levels of performance measurements by Schentler et al. (2010)

### 5.5.1. Project

Projects unfold in different stages during implementation. Evaluation thus exploits different segmentations and assessment done in every phase. From the evolution of the initial project concept to the draft, then prototype creation and up to the deployment step of the first product or service performance, evaluation can be carried out. This step generated process takes a practical assessment of the technicality of the innovation (Foken & Cosmuller, 2010). Further, the outcome that is measured is the market impact that the product created. If sales of the product have not actualized, then the innovation performance outcomes use proxies to measure the success at the granular level. The results can thence apply to decision making processes on the project such as resource allocation or termination or continuing with plans.

The project level developed concepts track the specific indicators that characterize the venture. These are lead time, engineering changes number, the call rate of the program and other operational characteristics. Therefore, if a project would not merit a startup operation but could give a platform for other merited tasks, then such a plan satisfies the operational magnitude requirements (Kloppenborg and Laning, 2012). The project level is the basic foundation and sources experiences as the firsthand touch of innovation. It, therefore, gives a groundwork to the whole system of an innovation strategy. As the essential parts that are geared up to produce the output, the project level should receive a proper balance of effort to ensure the whole outcome is innovative worthy. Therefore, the hypotheses posited as follows:

$H1a_s$: The project level practices associates with social innovation outcomes

$H1b_s$: The association between project level practices and social innovation outcomes is influenced by the innovation skills

$H1a_e$: The project level practices are associated with economic innovation outcomes

$H1b_e$: The association between project level practices and financial innovation outcomes is influenced by the innovation skills

$H1a_{ps}$: The project level practices are associated with public service innovation outcomes

$H1b_{ps}$: The association between project level practices and public service innovation outcomes is influenced by the innovation skills

This research concludes that the innovation practices at the project level are measured using various criteria in which the most important ones are captured in table 5.4. The Statements developed by the author based on concepts stated in the references.

Table 5.4: Project Level Statements

| Statements | References |
| --- | --- |
| People are encouraged to submit ideas in your organisation | Foken & Cosmuller (2010); Parston (2007); Agarwal & Selen (2013); Centre for Business Innovation (2017) |
| We generate and prototype new project ideas | |
| We can use work time to work with others on project ideas | |
| We capture the lessons learned from our projects | |
| We involve our stakeholders very closely with our business so that we all fully understand their project needs | |
| People are encouraged to submit ideas in your organisation | |

**5.5.2. Programs**

These are groupings of projects so that set objectives can be achieved. Bundling of projects to form programs relies on topical or technical comparisons between the plans. The clusters operate smoothly due to the staff support that connects all the current projects. This synergy gives complementary and supplementary relationship to projects and thus allows assessment with the same basis. It is more advantageous that analyzing the performance of a single project helps to accumulate risks and carries all inherent risks that involve individual projects (Kerssens-van et al. 2004). For example, a poor performing innovation project can easily be absorbed by another flourishing one with a sure survival chance. With a balancing of risks, workers can implement high-risk plans with the assurance of a positive outcome.

Workers creation of programs relies on risks and a reliable basis. The accomplishment rates of synergy projects are different, and some have little chance of survival. Moreover, the risk factors in each project either financial, time or resources-wise is different. Some projects within the program are stepping stones for the others. Therefore, considering these factors, a grouping of projects can be possible so that a single approach outcome achieves a stable innovation program (Lavagnon, 2009). In program level, the overall effect of the combined projects is considered without individually analyzing the components. Therefore, the hypotheses are posited as follows:

$H2a_s$: The program level practices are associated with social innovation outcomes

$H2b_s$: The association between program level practices and social innovation outcomes is influenced by the innovation skills

$H2a_e$: The program level practices are associated with economic innovation outcomes

$H2b_e$: The program level practices and financial innovation outcomes association is affected by innovation skills

$H2a_{ps}$: The program level practices are related to public service innovation outcomes

$H2b_{ps}$: The program level practices and public service innovation outcomes association is influenced by innovation skills

This research concludes that the innovation practices at the program level are measured using various criteria in which the most important ones are captured in table 5.5. The Statements developed by the author based on concepts stated in the references.

Table 5.5: Program Level Statements

| Statements | References |
|---|---|
| Lessons learned from projects are shared among the program | Kerssens-van Drongelen et al (2004); Bason (2010); Sellick (2011); O'Byrne et al. (2014), |
| Team members stay up-to-date of the most current knowledge within their field of work | |
| At the program level we are able to take “acceptable risks” when necessary | |
| Culture at the program level encourages risk-taking and collaboration efforts to implement new ideas | |
| Information about successful ideas is shared between projects and between program team members | |

### 5.5.3. Portfolio

The portfolio is a whole aspect of all projects concurrently operated in the organization structure. Such assessment of innovation performance involves two different ways. In one way all projects are assessed together to get the overall value accrued by the strategy. In the other way, all that comprises of the portfolio including balancing of risks and rewards is analyzed (Schentler, Lindner and Gleich, 2010). Consequently, it evaluates the future of the project cash flow as well as the balance regarding the expected impact in the market, risk, technical complexity and timing. Portfolios are moreover assessed for their relevance within the business strategy of the firm.

The concept shows clearly how the future investments support the outlined strategies and offset the perils subjected by transformational efforts. They also describe the rewards accrues from the research and development, commercial and technological uncertainty or the time it takes to market the innovation. Moreover, the portfolio indicators reveal the management of new ideas (Levine, 2010). These signs determine aspects of the time waste and resources spent between the end of the previous project and the start of a new initiation that would result in a full value adding program termed as the changeover waste. Therefore, the hypotheses are posited as follows:

$H3a_s$: The portfolio level practices are associated with social innovation outcomes

$H3b_s$: The association between portfolio-level practices and social innovation outcomes is influenced by the innovation skills

$H3a_e$: The portfolio level practices are related to economic innovation outcomes

$H3b_e$: The association between portfolio-level practices and social innovation outcomes is affected by the innovation skills

$H3a_{ps}$: The portfolio level practices are associated with public service innovation outcomes

$H3b_{ps}$: The association between portfolio-level practices and public service innovation outcomes is influenced by the innovation skills

This research concludes that the innovation practices at the portfolio level are rated using various criteria in which the most important ones are captured in table 5.6. The Statements developed by the author based on concepts stated in the references.

Table 5.6: Portfolio Level Statements

| Statements | References |
| --- | --- |
| Ideas in portfolio are evaluated to ensure the balance of projects in terms of their timing, technical complexity, expected market impact and risk level | Detecon International (2013); Albury (2005), Alsos et al. (2015) |
| Employees participate in important decisions taking on new ideas | |
| Constructive and critical analysis is conducted to determine if full implementation of an idea is viable | |
| The suitability of the idea is checked against the indicators of success | |
| Indicators to assess innovation results are defined | |
| Information about successful ideas is shared among innovation project portfolio | |

**5.5.4. Strategy**

The strategy level represented in this study depicts the company position as well as all the innovation efforts put place and the outcomes generated (Kaplan, 2017). It encompasses all the business units; on the specification, it consists of functional groups if the innovation was done in selected particular institutions. The notion gives a divide that analyses two aspects of the company;

1. New ideas exploration
2. Exploitation of new ideas

The company-level measures inputs, the process of innovation, outcomes, and factors within the business context such as culture. The indicators used are definite such as rate of change, ease of decision, and relevance of the management to make risky conclusions. Open innovation concept is also covered in the company level.

Smart innovators select sets of indicators that uncover how the innovation practice is aligned with the goals of the company and the applied strategies (Niven 2003). In the case of a policy that calls for renewal of product in the market rapidly, then the indicators will be the sales of the new product over the old one. A strategy aiming at after sales services will be measured by the design of the service given. Diversity and novelty of a product would be an innovative indicator for a company targeting to reduce the similarity of a product. Therefore, the hypotheses are posited as follows:

$H4a_s$: The strategy level practices are associated with social innovation outcomes

$H4b_s$: The association between strategy level practices and social innovation outcomes is influenced by the innovation skills

$H4a_e$: The strategy level practices are associated with economic innovation outcomes

$H4b_e$: The association between strategy level practices and economic innovation outcomes is influenced by the innovation skills

$H4a_{ps}$: The strategy level practices are associated with public service innovation outcomes

$H4b_{ps}$: The association between strategy level practices and public service innovation outcomes is influenced by the innovation skills

This research concludes that the innovation practices at strategy level get measured using various criteria in which the most important ones are captured in table 5.7. The Statements developed by the author based on concepts stated in the references.

Table 5.7: Strategy Level Statements

| **Statements** | **References** |
|---|---|
| Strategies are clear enough that we can translate it into innovation initiatives | Borins (2002); Kaplan (2017); Bland et al. (2010); Oetinger (2004), Boyne & Walker (2004) |
| Strategies match well with the way the market is evolving | |
| Approaches exist to ensure ideas are aligned to strategy before implementation | |
| Top management foster a culture that supports innovation | |
| Top management have a clear innovation vision and strategy | |
| Top management ensure that roles and responsibilities are properly assigned and communicated | |

| | |
|---|---|
| Innovation objectives exist at relevant functions and levels, which are consistent with the innovation vision and strategy | |
| Team members are free to bring ideas forward, regardless of their formal position | |
| Innovation process consists of structured and clear methods to develop new ideas and transform them into innovation value with the quality and timelines to achieve the results | |
| Innovation-specific recognition and reward systems are established | |
| There is a strong diffusion network between the opinion-leader and the change agent influences innovation decisions | |
| Information about successful ideas is shared within the organisation and among the strategic partners | |

### 5.5.5. Government's Council

The level presents the practices in the government, economy and national growth policies. The administration council represents the policy-making position in the public sector and this study identified as the highest level of innovation practices. The innovation evaluates the entire industry or economy to rate the outcome performance (Dinsmore & Cabanis-Brewin 2011). It focuses on a large geographical area, and a critical assessment will derive too much data to handle (Kerssens-van et al. 2004). Therefore, the council use few indicators from different firms as representations and then aggregate the data for assessment.

The eventual efficiency of systems within an industry/ nation is the expression of innovative efforts. Empirical methods are used to execute the exercise (De Luca, 2007). Data from surveys incorporate the methodological changes that have occurred within the industry. Domain experts from the external and internal sources also serve as a source of the data. There is a proper representation of the companies and industries in the innovation survey strategy. Analysis of methodological changes and uptake of new industry aspects define how the legislative council works to coordinate innovation. Therefore, the hypotheses are posited as follows:

$H5a_s$: The government level practices are associated with social innovation outcomes

$H5b_s$: The association between government level practices and social innovation outcomes is influenced by the innovation skills

$H5a_e$: The government level practices are associated with economic innovation outcomes

$H5b_e$: The association between public service level practices and economic innovation outcomes is influenced by the innovation skills

$H5a_{ps}$: The government level practices are associated with public service innovation outcomes

$H5b_{ps}$: The association between government level practices and public service innovation outcomes is influenced by the innovation skills

This research concludes that the innovation practices at the government level are measured using various criteria in which the most important ones are captured in table 5.8. The Statements developed by the author based on concepts stated in the references.

Table 5.8: Government Level Statements

| Statements | References |
|---|---|
| Our innovation project has successfully addressed an important problem of public concern in the government sector | Kerssens-van Drongelen et al. (2004);<br>De Luca (2007);<br>Pollitt & Hupe (2011),<br>Razak et al. (2016) |
| Our innovation project, or aspects of it, has shown promise of being spread or replicated by other government entities | |
| Diffusion of innovation strategy has added value, saved costs and generated new revenues across the government departments | |
| Projects and programs are related to the objectives and goals of the government strategy and achieve economic value on the national level | |
| Information about successful ideas is shared with other governments | |

## 5.6. Innovation Skills

Development of new ideas is the determinant of long-term success relies on stages and skills deployed in an innovation program. According to statistics, more than 80% of innovation result in positive returns on investment. Most organizations management cannot distinguish between value-adding change and performance gain. The concept is familiar in organizational leadership that fail to institute formal processes of innovation within their companies (Dong et al. 2014). Therefore, change is not a deliberate process from the management, but it occurs unexpectedly prompting a quick response by the administration. Voluntary efforts by management to initiate innovation are sustainable and measurable (Hatten and Timothy, 2015). For instance, resource allocation and staffing induced supports the change. Ideas are nurtured and mindset created which gives a right approach towards innovation. Management then through policy and their practice establish various operational plans, protocols, and respond to the external environment and constituents that influence the ideas positively. According to Rogers (1983), the innovation decision-making process consists of five stages as shown in figure 5.3.

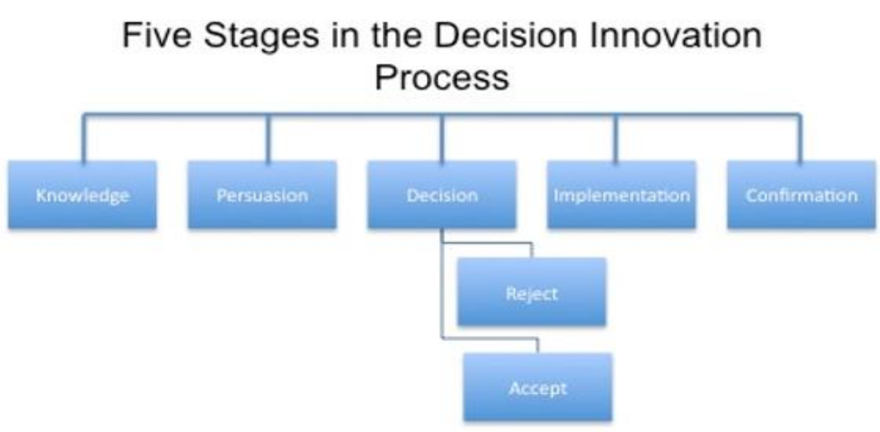


Figure 5.3: Innovation Stages by Rogers (1983)

### 5.6.1. Knowledge Stage Skills

The existence of the innovation becomes known to the business and individual. The newly developed knowledge gets induced through communication channels. The company then starts to inquire further about the new techniques in the market. It takes a three-step knowledge process. These include the awareness knowledge that seeks to assess the existence of the innovation, how-to- knowledge aims to find the use the change correctly, and the Principles concept finds the functioning of the product (Ismail, 2006).

According to Albert (2014), the skills required for this stage are creativity that opens up the employee to greater ideas through opening communication barriers. A creative worker finds it easy to develop new plans and with proper evaluation of the views, find a solution to problems within the business environment. Curiosity is a trait needed to ensure thirst for knowledge. Visionary employees can see beyond the idea stage into the real actualization. Further, this stage requires one with the ability to experiment with new things and explore new ventures. Brainstorming through teamwork and communication with other knowledgeable persons improves small ideas into great ones. Once an impression has been born, innovation still comes in with promoting the concept regularly.

Specifically, knowledge transfer program in the public sector affect proposals to ensure exchange of information across organization generations. Garud et al. (2013) add that the created and shared ideas based on the innovative traditions adopted within the organization to enhance its flexibility. The countless benefits achieved include effective governance and administration in public service that has a pool of know-how on different matters concerning innovation. Other than brainstorming and creative-oriented measures, the knowledge stage avails organizational training and learning programs to keep the workforce updated (Hartley 2013). The adorable knowledge implemented acts as design training for innovative measures and efficient transfer of best techniques on innovation culture. Table 5.9 presents the needed skills at the innovation knowledge stage cycle. The Statements developed by the author based on concepts stated in the references.

Table 5.9: Knowledge Stage Skills

| Statements | References |
|---|---|
| Creativity can be fostered by removing barriers to knowledge-sharing | Rogers (1983); Rogers (2003); Ismail (2006); Graham-Leviss (2016); Gamal (2011); Horth & Buchner (2015); Autor (2015); Spotts (1999); Wejnert (2002); Centre for Business Innovation (2017) Garud et al. (2013) Albert (2014) Hartley (2013) |
| Idea formation skill helps individuals to generate innovative ideas | |
| Evaluating ideas is based on a predetermined cost-benefit analysis | |
| Problem solving is approached from innovation perspective | |
| Curiosity is a prerequisite for knowledge searching | |
| Insights drive individuals to seek realistic improvement opportunities | |
| Inquisitiveness for opportunity catalyzes the acquisition of awareness knowledge | |
| Inquisitiveness for opportunity builds resourcefulness for knowledge modification and application | |
| Adventure in trying out new approaches facilitates knowledge-search | |
| Openness to new approaches expands opportunities | |
| Ability to explore new ventures catalyzes the creation of knowledge | |
| The capacity to explore ideas catalyzes problem-solving | |
| Teamwork fosters risk-sharing leading to better generation of ideas | |
| Communication improves knowledge sharing and diffusion | |
| Continuous improvement facilitates knowledge improvement | |

### 5.6.2. Persuasion Stage Skills

It is an aspect that comes about with an unfavorable or favorable attitude from an individual or business towards an innovation (Rogers, 1983). It comes right after knowledge stage as one type of perception about something once an individual acknowledges its presence. At this stage, there is uncertainty about innovation and any form of positive or negative feedback influence the level of difficulty. Interpersonal communication, in this case, provides a reasonable basis for positive feedback (Sherry, 1997).

Relationships with other stakeholders allow for consultation. With constant feedback, one can comfortably assess the situation of the innovation and the outcomes it may bring. Further, persuasion skills help set up informative analysis on the topic, and this builds up the idea supported by necessary information that could convince its implementation (De Vries, Victor & Lars, 2016). With the relevant information, previous doubt on the idea fades. Barriers might be present as projected from the idea analysis. However, gained problem-solving skills help to find ways to mitigate these barriers (Adam, 2014). Sociability will invite output from other people on ways to deal with problems. Also, lateral thinking is resourceful in the manipulation of the available data for innovation use. It also makes one think beyond the distinct possibilities.

Government as a custodian of the public sector innovation management is confident that persuasion improves and contradicts the process. For instance, the context of influence might stem from public office barrier who have less knowledge of innovation. D'Este et al. (2012) point out that this not only contradicts the process but makes it hard to have a flexible venue to nurture new techniques in business. The society will admit adopting a good innovation that sensitizes all members on the reason for certain changes in the service or good delivery (Borins 2014). However, with little knowledge of what innovation positive persuading takes, the public service will work on a blind strategy to embrace new techniques into business. Table 5.10 presents the needed skills at the innovation persuasion stage cycle. The Statements developed by the author based on concepts stated in the references.

Table 5.10: Persuasion Stage Skills

| Statements | References |
| --- | --- |
| The presence of relationship skills facilitates the individual to search for feedback from multiple stakeholders | Rogers (1983); Rogers (2003); Sherry (1997); Adam (2014); Chen et al. (2016); Graham-Leviss (2016); Gamal (2011); Horth & Buchner (2015); Autor (2015); Spotts (1999); Wejnert (2002); Centre for Business Innovation (2017) |
| Persuasion skill helps individual to assess the innovative idea using enabler factors | |
| Persuasion skill improves individual ability to build new idea based on accurate information | |
| Collaboration helps the individual to better understand the innovative idea | |
| A pursue of team approach to information search, returns a richer variety of ideas | |
| Problem solving skills enable the individual to persevere in searching for innovative ideas | |
| Communication skills improve the efficacy of the information-search process | |
| Multi-cultural competence enables the individual to follow information from different cultural contexts | |
| An entrepreneurial mindset induces the individual to focus on the possibilities not the challenge | |
| Sociability creates a more welcoming environment for individuals with information to share | |
| Problem visualization can empower individuals to pursue on innovative ideas | |
| Lateral thinking makes the individual more resourceful with the available information | |
| Lateral thinking makes the individual more likely to pursue innovative ideas because they can think beyond the obstacles | |

### 5.6.3. Decision Stage Skills

The business entity or management takes to rejecting or adopting the innovation. It may be preceded by small trials to increase the chances for acceptance, but this does not hold for all types of innovations (Rogers, 1983). The decision is also not permanent and may change with business environment preferences.

The outcomes of the decision stage involve four levels. A continued adoption is the first stage which is favorable and permanently adopted. The later passage is also another way to go with where the business entity sees the innovation as good but choose implementation and a later date. Discontinuance occurs when the change is implemented at first then is rejected afterward. Continued rejection is when the innovation is denied from the onset decision.

Skills required for the decision stage include risk assessment. Such aspect enables one to encompass all the possible financial, resources and time that may be lost in the innovational endeavor. Diligence ensures evaluation of the risk is fully covered leaving no loopholes. Proactive people are fast and effective in creating solutions. Teamwork puts many perspectives together, and decision making becomes quicker and more effective. Proper communication will uncover all risk without hiding or understating (Hogan and Leonard, 2014). The unbiased make realistic choices. One with incubation techniques can forecast the utility of idea. Modeling simulates the real thing and enables for prediction. One who accurately presents the arguments on both sides initiates proper decisions.

Strategically, the decision stage tries to delineate resources that will support the move to initiate changes in an existing public sector structure. Meijer (2014) asserts that the involved parties deliberating on new techniques need to agree on specific objectives that will drive inventive culture. Whether aligned on the opposing or the proposing side of developed decision, individuals setting innovation ideas need to consider the constraints and viability of the organization to sustain new ambitions (Sørensen & Jacob 2016). Therefore, as a decisive process decision stage puts it clear that all deliberation made are susceptible to political, social, and economic constraints. The approach gives organizations an opportunity to comprehensively assess their capability to integrate specific innovative decision and disregard the others. Table 5.11 presents the needed skills at the innovation-decision stage cycle. The Statements developed by the author based on concepts stated in the references.

Table 5.11: Decision Stage Skills

| Statements | References |
|---|---|
| Understanding the risks associated with innovative idea increases the chance of adopting the idea | Rogers (1983); Rogers (2003); Hogan & Leonard (2014); Graham-Leviss (2016); Horth & Buchner (2015); Gamal (2011); Autor (2015); Spotts (1999); Wejnert (2002); Centre for Business Innovation (2017) |
| Smart and diligent individuals spend more time on the evaluation of potential innovation | |
| Being proactive in the innovation idea catalyzes the decision-making process | |
| Teamwork enriches the decision process | |
| Problem solving skills catalyze the decision process | |
| Communication of risk enrich the decision on adopting new ideas | |
| Decision-making power facilitates adoption of new ideas | |
| Unbiased thinking leads to the selection of the most realistic choice | |
| Incubation techniques influence the degree to which the innovation meets the expected outcomes | |
| Modeling concepts provide adequate simulation to make informed decisions | |
| Prototyping efficiently exposes the real world efficacy of the decision by testing it accordingly | |
| Understanding and manipulating information sets facilitates more accurate forecasting for the performance of the innovation | |
| The presentation of the argument for and against the decision, facilitates informed buy-in or resistance | |

### 5.6.4. Implementation Stage Skills

The stage puts changes introduced through innovation into daily use. The overall behavior in the public sector change as there is a new process, idea or way of doing things. However, change brings uncertainties and makes implementations of innovations hard. There should be therefore continuous information flow and technical assistance with the new technology. When people are familiar with it, then it loses its distinct quality (Rogers, 2003).

Implementation skills help one to adapt to the right implementation tools. Persistence gives a reason not to give up. Performance metrics ensures that enough is done within the specified resources frame. Planning skills will enable stepwise implementation. Coordination with other people within the implementation program must be there to enhance oneness of the set goal and purpose in every stage. Teamwork ensures much is done over a short period.  In case of problems arising during implementation, problem-solving skills come in handy. Afuah (2003) notes that reactive abilities provide a solution above the normal while the risk-taking allows for the trial of newer risky methods. Managerial skills enable one to be accountable and delegate duties while ensuring there is overall efficiency in implementation.

With the above considerations ranging from uncertainties of change, to team works, shared knowledge, and problem-solving skills, organizations need to assess their innovation appetite. Implementation ought to succeed when inherent ability and competence for innovation have full approval of uniquely addressing changes in all perspectives. The objectives which implementation stage has its foundation should demonstrate the culture and vital processes of an organization. The process entails having the leverage of current innovation expertise already in the sector compared to the assessed requirement to successfully have new changes work (Bartlett and Dibben, 2002). The implementation stage then creates an extent to which skills, culture, and value adopted by the culture transform a public entity. Table 5.12 presents the needed skills at the innovation implementation stage cycle. The Statements developed by the author based on concepts stated in the references.

Table 5.12: Implementation Stage Skills

| Statements | References |
|---|---|
| Implementation skill helps adapt the right tools and technologies to complete a task, project, or assignment | Rogers (1983); Rogers (2003); Graham-Leviss (2016); Horth & Buchner (2015); Gamal (2011); Autor (2015); Spotts (1999); Wejnert (2002); Centre for Business Innovation (2017) |
| Employees must be tenacious and persistent to the innovation implemented | |
| Relationship-building skill encourages knowledge-sharing during implementation of the innovative idea | |
| Accountability fosters stakeholder adoption of innovation | |
| Performance measurement encourages the adoption of innovation | |
| Planning effectively shows the level of fit between the innovation and its usability | |
| Coordination streamlines implementation processes to improve value chain efficiency | |
| Teamwork provides the opportunity to successful implementation of new ideas | |
| Problem solving skills assist in eliminating obstacles for innovation implementation | |
| Ability to communicate issues generates opportunities in the implementation from multiple perspectives | |
| Creative abilities have positive impact on innovation quality | |
| Risk-taking skills enables the implementers to continue with the process and therefore transcend challenges | |
| Managerial skills influence the rates of accountability and delegation | |
| Managerial skills determine the efficacy of team work in innovation implementation | |
| The level of cohesion between the team determines the success of implementation | |

### 5.6.5. Scaling-Up Stage Skills

Human behavior dictates that after the adoption of a specific innovation, there is a need to seek more information to justify its use. The more scale-up approach seeks information to justify the use of the change (Ismail, 2006). The information gathered during the persuasion stage will work to ensure continued use of the innovation. Eventually, there are two ways emphasized by this stage. For instance, scaling up becomes essential where the business or individual mitigates the use of the novelty processes and adopt a better option. Discontinuance comes in when an individual is dissatisfied and stops using the product.

This stage offers one a chance to support their choice. Therefore, one should possess a management approach to determine the risks involved and the role of the stakeholders. Team cohesion determines how the team will support their plans to scale up (Tony, 2014). Endurance will ensure redress of obstacles with, and there is resilience before scaling up. Experts have more information about the innovation. Contacting them and sharing information with them will help put one at a better-placed position for scaling up decision (Royle, 2014). Negotiation convinces people during decisions to scale up. Other skills needed in this process include collaboration, management, and learning.

Importantly, scaling-up skill is a commonly-used metric to link personal knowhow to the broad, innovative plan. Although the approach does not focus on the growth in a set period, the target skills get aligned to public sector innovation framework in support of all stakeholders (Jing, & Ting 2012). In various studies assessing innovation standards and development in public-oriented organizations, investors look for more driving skills. The abilities as well serve as employees' metrics that management feels convinced to use from a starting point and scale them up to enhance and accommodate changes introduced by innovation (Bason, 2010). Thus the scale-up concept not only addresses the changes but device new mechanism to evaluate the viability of advanced innovation programs. Table 5.13 presents the needed skills at the innovation scaling-up stage cycle. The Statements developed by the author based on concepts stated in the references.

Table 5.13: Scaling-up Stage Skills

| Statements | References |
|---|---|
| The managerial approach determines stakeholder involvement in scaling-up | Rogers (1983); Rogers (2003); Ismail (2006); Tony (2014); Royle (2014); Graham-Leviss (2016); Horth & Buchner (2015); Gamal (2011); Autor (2015); Spotts (1999); Wejnert (2002); Centre for Business Innovation (2017) |
| The managerial approach has influence on the risk which is acceptable in scaling-up | |
| Team cohesion determines the team's divergence on scaling-up | |
| Emotional intelligence exposes the stakeholders' perception about the scaling-up of the adopted innovation | |
| Endurance to obstacles provides a foundation on which the implementers can scale-up the adoption of innovation | |
| Openness on new ideas and continuous improvement assist in the scaling-up process | |
| Sharing information and expertise inside the organization helps in the scaling-up process | |
| Negotiation skill overcomes barriers among people that may hinder the scaling-up of the innovation | |
| Individuals with negotiation skill provide sources for assisting the scale-up process | |
| Delegating responsibility and providing support improve the chance of the scaling-up success | |
| Collaboration makes it easy for the scaling-up process | |
| Collaborative efforts facilitate allocation of resources for networking and sharing ideas, knowledge, and skills to improve the scaling process | |
| Recognizing opportunities for change and improvement facilitates the scaling process | |
| The existence of the continuous improvement ethos facilitates the scaling process | |
| Accepting feedback and learning from experience and mistakes leads to scaling-up innovative ideas successfully | |

## 5.7. Contribution to Knowledge

Innovation in the public sector has in the recent past gained interest from different scholars on its aspect of contribution to the knowledge of the changes. Many of the intellectuals believe that embracing the idea of innovation can result in quality outcomes of the public service. The intensive information covered in this study provides an insight that the public sector operates like any other segmentation. However, lack of competitive institutions in most of the services offered makes it hard to embrace changes with insignificant or no experienced pressure to deliver (Bason, 2010). With the private and other sponsored sectors providing quality services at a cheaper price, the public sector feels threatened and adoption of change becomes a requirement.

Crosby et al. (2016) claims that the public sector innovation also integrates new role-play as a contributing source of the different knowledge to link reform movements in all service delivery sections. In the public administration, different reviewed studies emphasize the conceptual aspect of innovation in the project-based activities at the society level. The know-how contribution attests that change is reflected in different output as an outcome of the applied knowledge. As an ideal practice, contemporary literature on innovation management states that the concept works entirely based on the perception that public sector grants it. If opportunity that the knowledge contribution grants works perfectly, most of the civil service departments realize something new on the change management (Garud et al. 2013). For instance, the economic development scholars believe that innovation in the strategy based-business distinguishes change and innovation. The critical insight is that change may refer to new office bearers taking control, but innovation targets the comprehensive approach of doing things and altering it to something unique (De Vries et al. 2016). Thus innovation reviewed across the study shows the aspect as a specific change intended to address a particular objective at a time.

The public service innovation is extensively rooted in the innovative practices that establish five levels including project, program, portfolio, strategy, and governing council. The knowledge contribution developed across the established project levels in this study insists that it unfolds different subdivisions to guide the introduction of new goods or service in the society. The assumption of shared responsibility through designated units is emphasized to ensure the relevance of integrating new reforms remains extensively tapped. Programs level bring a clear understanding that for the above projects to succeed, it's this concept which evaluates the risky outcomes. Therefore, the public service innovation objectives are set based on implemented limits by the program level. The portfolio level develops the value for which it's relevant for the public sector to integrate innovation (Jing & Ting 2012). The managing process in the individual project-based organizations ensures understanding of motivating factors such as reward that promote innovative culture.

Nuttaneeya and Anthony (2016) add that the public service finds it relevant to initiate a rational connection between the social and economic outcomes based on innovation. On the other hand, the strategy level is reviewed by the study to encompass all units in the organization. The public service innovation enforces new ideas exploration and exploitation as the primary approach to enhance a perfectly and working reforms in the societal-service delivering businesses. Conclusively, government councils coordinate the first four levels through assessment of the whole industry. The public innovation then relies on comprehensive outcomes from such evaluation for effective diffusion of artistic culture in the communal-organizations (Bartlett and Dibben, 2002).

Further, the integration between innovation stages (developed by Rogers) and innovation skills (generated by the author) on the diffusion process creates an understanding of several improvements to enforce successful public sector innovations. The value attributed to the model is that it links actualized idea into a successful concept. Management in a public-based organization develop an essential understanding of specific skills stated by author and use them to address complex processes of fixing innovation in the public-oriented goods or services. That notwithstanding the diffusion process including skills reveals change as a comprehensive process of improving what exists in a current situation of the public domain. Notably, the knowledge contribution of the developed model asserts that communication skills in all stages are vital in identifying innovative ideas within the public realm. Importantly, the input of skills at any innovation stage bring in new knowledge meant to add the value of services to the users and make them more competitive.

The aspect has a close link to the first stage of innovation which is the innovation knowledge process. Besides, all the skills identified above target new ideas as a measure to assess the success of the public sector. The linking factor from the knowledge stage to the scaling-up stage rely on the skills to identify innovative ideas that exist. Thus the diffusion of innovation through knowledge contributing skills link ideally developed opportunities to formed teamwork groups at public-based organizations. The competency and the multi-cultural skills are re-emphasized to enhance the sensitivity of innovation diffusion with a clear understanding of diversities that define societies in which public-based organizations operate.

Innovation skills involve a wide range of diverse approaches meant to create an interactive environment for new technique deployed across the public sector. The knowledge skill stage offers the overall guidance to the competence embraced to ensure innovation is relevant to the subsection of public subdivisions. The aspect creates know-how pathway that guides the administration to engage the right workforce while intending to excel in enforcing innovation. Importantly, the persuasion offers a knowledgeable concept that innovation cannot work without a particular link of communication. The interpersonal exchange of information among the department in public-based organizations enhance the creation of directives that both the negative and positive outcomes of interventions. Lastly, the decision and implantation stages provide an overall platform from which adopted techniques become applicable. The innovation brings in the need to scale-up the ordinary ways of doing things with a priority assigned to deliberate innovation decision that creates a long-term positive impact after engaging innovation at each level of delivery. Therefore, the thesis and above-covered areas show that change as a source of growth but because the rights skills, administration and evaluating the possible factors are put into considerations.

The contribution of the body of knowledge developed by this thesis is that the public-based sectors operate like a private business. However, more of its source resources stems from the government disposals to aid their role-play to achieve the set goals. In an event that bodies like the government come in the target is to access the three major concepts developed in the conceptual framework; innovation practices, innovation skills, and potential innovation outcomes. The practices create a roadmap of innovation diffusion through the creation of projects, program, portfolio, strategy, and a governing council. The innovation skills determine the accuracy of the practices deployed across the five practice areas. It also bridges the outcomes with source efforts in that resource invested projects or programs attracts certain skills to achieve a particular level of innovation. Importantly, the potential outcomes provide critical understanding that as a public-based organization, a business is driving on the right or wrong direction. The sensitivity and reliability of innovation, therefore, requires innovation skills scale all set practices with the goal of the two is to achieve excellent outcomes.

## 5.8. Summary

Conclusively, the primary stakeholders with the necessary knowledge and intention to initiate innovation include the management, employees and the regulators of the external environment. The administration plays a decisive role in leadership through launching, interpreting and creating focus towards a successful public sector innovation. Regulators of internal and external public sector situational factors and management offer relational directive to enhance the spread of the innovative ideas. Once the ideas reach designated areas, it's the responsibility for deployment units to engage innovation through the projects, portfolios and company level models.

The stages involved in uptake of essential information includes knowledge, persuasion, decision, implementation, and scaling-up. Innovation has its benefits to the organization, the employee, the society and the public sector. The overall contributing knowledge in this study acknowledges that the public sector like the private segmentation needs to consider a hypersensitive approach for quality services and products to members of the society. The rationale of integrating the models of innovative culture will thus place public sector innovation as one of the successful sectors globally.

# 6. CHAPTER SIX: RESEARCH METHODOLOGY

## 6.1. Introduction

This chapter presents an in-depth explanation of the methodology used by the researcher to pursue the study objectives. The section highlights the adopted research philosophy, approach and study methods, survey rating instruments, ethical considerations, and limitation. It also compares the conventional approaches and procedures followed in a similar research context.

## 6.2. Research Outline

The selection of a research approach is mainly driven by the particular research questions and the nature of the problem to be further investigated (Trauth, 2001). Among innovation, strategy and project management researches, there is no agreement on appropriate research paradigms that have an overall consideration compared to others in the existing published literature. Therefore, the specific selected research method is argued to be based on the researcher's philosophical approach and the research critic (Norrie, 2006).

Arlt (2010) in his doctoral thesis in project management the author has developed a research approach section based on the taxonomy introduced by Saunders et al. (2003) titled as the "research onion". As demonstrated in figure 6.1, the concept is synthesized by major components of research principles; philosophy, approach, methodology, time horizon and techniques, and procedures. According to Arlt (2010, p. 82) "the "research onion" of Saunders et al. (2003) shall be unpeeled to provide the baseline for the research framework". For the sake of outlining the research approach section of this paper; the same "research onion" shall be followed.

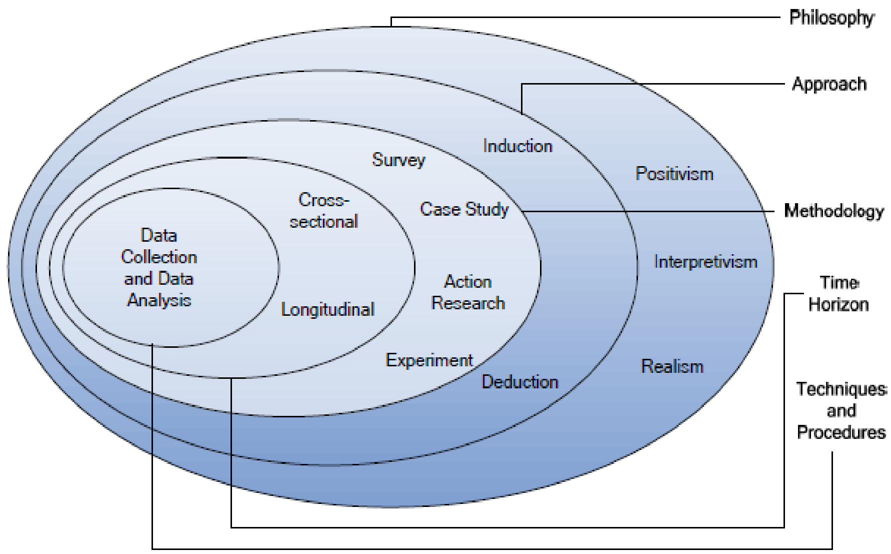


Figure 6.1: The Research Onion (Saunders et al. 2003, p. 132)

## 6.3. Research Philosophy

A research philosophy or paradigm is a study approach used to develop knowledge for data manipulation (how data is captured and analyzed), through the use of scientific literature and common rational tactics, which are illustrated in table 6.1 (Neville 2007; Arlt 2010).

Table 6.1: Research Philosophical approaches according to (Neville, 2007; Arlt, 2010):

| Research Philosophy | Can also be Referred to (Neville 2007): | Attempts to Understand (Arlt 2010, p. 83): |
|---|---|---|
| **Positivism** | Quantitative, Objectivist, Scientific, Experimentalist or Traditionalist | "Objective reality" |
| **Interpretivism** | Phenomenological, Qualitative, Subjectivist or Humanistic | “Subjective reality (as perceived by subjects studied)” |
| **Realism** | Not given | "Reality in the context of observable hidden root causes" |

Neville (2007, p. 7) stated that “Positivistic approaches seek to identify, measure and evaluate any phenomena and to provide a rational explanation. This explanation will attempt to establish causal links and relationships between the different elements (or variables) of the subject and relate them to a particular theory or practice”. This type of philosophical approach usually undertakes rationalized tactics to validate and test the established research hypotheses with the help of quantitatively generated data. The finding of such philosophy can be simply generalized as it typically contributes to existing body of knowledge (Stiles, 2003). Whereas, the interpretive research approach attempts to understand the participant’s behaviors and focuses on the need to observe and interpret subjective reality (Neville 2007). Human conduct is neither easily measured as phenomena nor as observable trait by the reflected factors. The approach stems from the possibility of inconsistency in the shaped factors between individuals during the interpretation of particular phenomena. Notably, individuals place their meanings on events. Such an approach may use a relatively small sample that enables generation of rich data in personal insights. However, the results are not valid to be generalized due to a small sampling. Though, interpretive approach "will provide the complete conclusion about what phenomenon is occurring and why in any particular context" (Norrie 2006, p. 80).

This research is designed to validate proposed hypotheses based on categorical, quantifiable variables. Prior investigations within the same area (Kaplan and Maxwell 1994; Walsham 1993) perceive that the positivist approach lacks the social reality of the individuals studied thus accounting as a major drawback for many social scientists. The characteristic of inclusion and the social fact differentiate the interpretive from the positivist approach, in the sense that the ultimate one tends to emphasize the "what" and ignore the question of "why”.

For this research paper and depending on positivist exploration, it will yield a rational explanation for establishing causal links and relationships between the different elements (or variables). In the context of innovation and strategic management in which innovative project-related practices can intimately associate with the particular theory, the specification of government involvement is vital (Norrie 2006). Applying the interpretive approach will result in a narrow and confined conclusion particularly on respondents' behavioral aspect. Thus, positivist is an ideal position for this research design in which the philosophy considers its focus on an approach that targets validation of the truth of a hypothesis contributing to research questions.

## 6.4. Research Approach

According to the "research onion" of Saunders et al. (2003), the two most common research approaches are, deductive and inductive, as presented in figure 6.2. Both of them promote data collection and theory development. Deductive typically defined from the general theory and articulated hypotheses then move to specific study through the observation and confirmation with the help of qualitative or quantitative data. The inductive research, by contrast, begins with accurate observations and then seeks to explore patterns that lead to broader generalization and theories. Throughout the reviewed literature, most of the research studies applied the two approaches simultaneously to enable flexibility and balanced perspective (Hyde 2000).

It is clear that this research paper will apply the deductive approach to keep in line with developed general theories of innovation and project management. The study also attempts to validate the established hypotheses to achieve specific findings within particular governmental context.

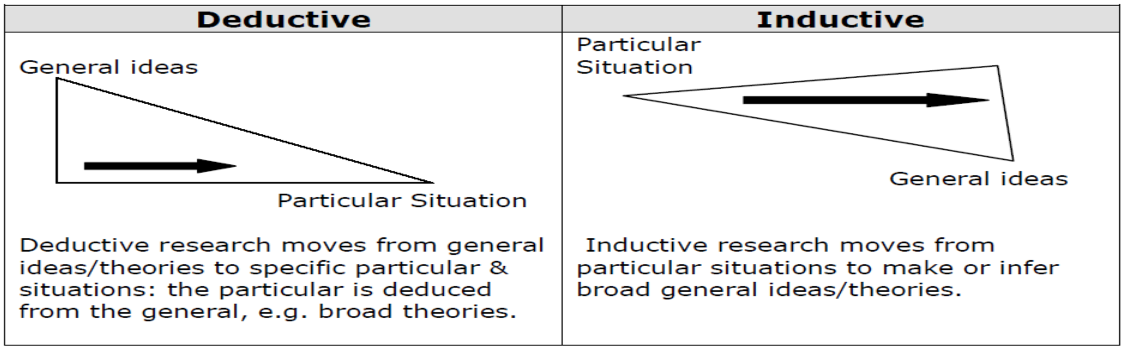


Figure 6.2: Deductive and Inductive Research Approach (Neville 2007, p. 4)

## 6.5. Research Methodology

Research methodology is the core of the research framework, and it can be defined as the process used to collect data and information. There are four main methods within the mentioned taxonomy which are; survey, case study, experiment and research action.

The survey is widely used as a simple method for collecting data, particularly in social science. It supports both inductive and deductive research, as it can be used in validating theories and proving hypotheses (deductive) or observing the situation to generate patterns that guide to formulate arguments (inductive). According to (Neville 2007, p. 8) "There are two main types of survey: a descriptive survey: concerned with identifying and counting the frequency of a particular response among the survey group, or an analytical survey: to analyze the relationship between different elements (variables) in a sample group". The application of the survey involves typically a selection of unbiased group that the researcher targets as a sample for the study using the technique of interviews or questionnaires, or both of the methods.

A case study can generally accept methodology to generate qualitative or quantitative information in a single setting. It is used for in-depth analyses for particular research to test or create theories. Whereas, action research requires the researcher's intervention to monitor, evaluate and suggest an improvement to the situation being studied. Such methodology is time-consuming and needs active co-operation between researcher and individuals involved in the change process. Experiment studies are structured in a way that the validation of the study variables are done in more controllable and manipulation manner, and it tends to give optimum results when the tests are done in a structured environment such as laboratories.

This research makes use of the analytical type of survey methodology as the study is designed to find and analyze the relationship between innovation practices and creative skills and how the significance of the concepts in achieving potential innovation outcomes. Arlt (2010) used a survey methodology in his doctoral thesis to support and validate the research propositions. For the sake of collecting data, a pre-defined questionnaire developed by the author and distributed among individuals who are mainly responsible or involved with innovation, projects, strategy formulation, and implementation in the UAE public sector.

## 6.6. Time Horizon

The application of action research is correlated with longitudinal time horizon. While the research effort is concerned at one specific point in time then the choice typically implies a cross-sectional time horizon, such survey needs to observe and analyze the differences and similarities of a particular situation at one specific time in different organizations (Neville 2007).

The survey for this research was created and then launched for data collection between 29 September and 21 November 2017, which means the review applied for almost 54 days before being disconnected by the researcher to generate the data from the online database in SPSS format.

## 6.7. Research Techniques and Procedures

Data can be collected using one or multiple information gathering techniques by which all given research questions must be satisfactorily considered. The research may, as well, consider other factors such as data quality, time and efforts consumption, and response rates. The most common instruments used to collect data for a topic and studied empirically includes: one-to-one interviews, focus group, observation, and a survey questionnaire.

The data analyses typically fall into two types; exploratory (inductive approach) and confirmatory (deductive approach). While the exploratory aims to look for patterns that deviate from the model, the confirmatory attempts to quantify to what extent the deviation might occur. It employs the traditional statistical tools of inference, significance, and confidence.

The analyses of quantitative data typically undergo through special statistical manipulation programs such as SPSS - Statistical Package for Social Science. SPSS is a powerful tool originated as long ago as 1968, and even nowadays it is a commonly used program for data presentation and analysis statistically. It can manipulate the data and perform sophisticated statistical operations (Anne, 2011). Such programs assist in conducting different tests, for example; reliability, factor analysis, correlations, and regressions. Thus, it helps in accepting or rejecting the developed hypotheses and can explain the significance of the relationship between independent and dependent variables. This research study will conduct appropriate tests to validate the earlier developed assumptions and conclude the findings.

## 6.8. Methods

Quantitative research methods are focused on measurements and amounts of characteristics of interest, which are studied through the use of quantifying methods, statistical analysis, and mathematical calculations (Thomas 2003). Quantitative researchers encourage explanations and predictions that may be generalized to other populations (Thomas 2003). Since little is known yet on the public sector innovation practices and measurements, the present quantitative method study is of an examining character and will be conducted in the form of an exploratory survey (Karlsson 2008; Paneerselvam 2004).

On the other hand, Creswell et al. (2003) identified six strategies for mixed methods research design. One of the relevant procedures for the existing research is the "sequential explanatory", see figure 6.3. This design is characterized by the collection and analysis of data quantitatively and then qualitatively. The rationale of this strategy is to utilize the results of a qualitative study to assist in explaining and interpreting the findings of the quantitative research.

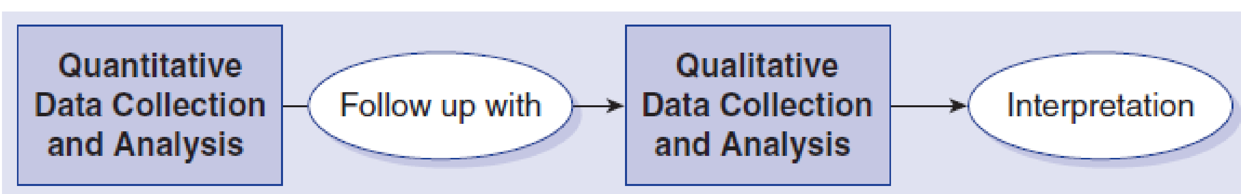


Figure 6.3: The Explanatory Sequential Design

The research is framed in a way that follows the positivistic philosophical approach, as explained previously. Consequently, the research will be conducted with the help of quantitative method solely. The quantifiable study shall be sufficient to explore general descriptions that assess particular instances and testing of causal hypotheses and validate the relationship between different variables.

## 6.9. Instrument

The data collection instrument which will be used by the researcher is a closed-ended questionnaire. Noteworthy, device is recommended by scholars as it facilitates quantitative data analysis (Bryman and Bell, 2015). Moreover, the closed-ended questionnaire is more comfortable and faster for the respondents to answer because they have to check one option with which they identify. Accordingly, the fact that they do not have to write down their answers ensures that a more significant number of respondents will have the opportunity to respond to questions. The questionnaires have a probability of being handed back early enough as compared to another type of inquiry (open-ended). Furthermore, Bryman (2015) acknowledges that the closed-ended questionnaires are more accessible to analyze statistically. The responses can be quantified uniformly, so it is more practical to interpret such information using statistical tools. Noteworthy, the numerical efficacy of the closed-ended questionnaire has supported a study which was conducted by Wu et al. (2015). However, they also acknowledge that this approach limits the responses to the research question drastically. Some reactions may shed more contextual understanding of the study, but since the questionnaires remained closed, the study was contained within the boundaries of the researchers' imagination. Fung et al. (2015) have also used this approach in their research, but unlike Wu et al. (2015), this group of researchers did not efficiently examine the implications of their usage of a closed-ended questionnaire in their study.

In considering the best of researcher knowledge, the literature lacks a complete instrument (questionnaire) that accommodates the proposed research questions and methods to peruse the existing research. Therefore, the researcher intends to construct his questionnaire using the help of theoretical background and the concepts explained in the relevant analyses.

The instrument was tested through a pilot study. It is a strategy that followed by the researcher to preliminary experiment the questionnaire with a smaller sample compared with the planned sample size. A pilot study is commonly used by researchers to evaluate the survey concerning its feasibility, time, accuracy, and ensure all items are relevant and understandable by the potential respondents before the actual performing of data collection on the full-scale.

With the need to make the data generation process comfortable and more convenient to the responder; the questionnaire has been designed electronically and distributed to the individuals' email address through a specialized online system using a web link. Such a system offers speediness and advances functionality to collect data and generate different types of reports including excel and SPSS files. Also, the survey link was sent to the targeted groups in a separate email message as well as using online networking and social media applications such as LinkedIn and WhatsApp. These tools assist the researcher to reach the potential questionnaire participants and to ensure a higher percentage of respondents. Out of experience, reaching individuals with the same interest and background of the research topic will increase the opportunity of completion all the survey questions.

## 6.10. Questionnaire Development

Literature has evaluated various factors that could affect the diffusion of innovation in the public sector. However, as presented in the conceptual framework this research is centered on three major triggered factors; they are innovation practices, innovation skills, and potential innovation outcomes. For the sake of having more specific and measurable actions of the terms used in the conceptual framework, the survey and analyses parts refer to "innovation practices" construct as "performance level measurement". The "innovation skills" also referred to as "innovation stages skills" construct attempts to explore the skills required at each stage of the innovation process to diffuse innovation in the public sector. The "potential innovation outcomes" construct referred as "innovation outcomes" and it attempts to ascertain the perception of UAE public sector innovation practitioners on the potential outcomes of innovation diffusion from a socioeconomic and public services perspective.

Those factors become a dominant construct of the designed questionnaire representing three main questions; which then extends to five sub-questions for the innovation practices part, and five sub-questions as well for the innovation skills part, and one sub-question for the innovation outcomes part. To ensure the comprehensibility and reliability of the collected data, the researcher will run initial tests on the data using Cronbach's Alpha method.

The questionnaire is designed to fit the purpose of this research to articulate the research questions and the study variables; in which it consists of four main sections, as follows:

### 6.10.1. Part One: Innovation Performance Measurements

The innovation performance measurement part represents five categories which are drawn from existing frameworks and have been re-ordered and partially shrunk to fit the scope of current research. The groups mainly used here covers a wide range of affected measurements on each level from granular level up to an entire government structure. The standards include project, program, portfolio, strategy, and governing council. The author developed between 5 to 6 statements for all levels, except the strategy level which consists of 12 comments. Based on the mentioned statement of each level, the respondents were concisely asked to respond with Likert scale. The scale includes five ascending variations which range from strongly disagree (when the postulation deviates from their perception) to strongly agree (when the postulation is aligned with their opinion).

### 6.10.2. Part Two: Innovation Skills

The section aims to explore how particular skills are applied in each stage of innovation diffusion. As discussed in the literature review and theoretical framework chapter, the five successive ordered stages of innovation include the knowledge, persuasion, decision-making, implementation, and scaling-up. To develop this section, the author has compiled a list of most essential skills required to diffuse the innovation in the public sector. Thus, based on their definition each of innovation stage is contingent on a set of skills, which the researcher has operationalized in the statements. Some common capabilities such as communication, teamwork, and problem-solving are noted to be applicable across all stages from discovering the idea to scaling-up the innovative design. Noteworthy, each step had a between 13 to 15 statements. However, the accounts range on each skill based on its authenticity and relevance to the study topic. Depending on the ability, the respondents were asked to respond with 5 points Likert scale from strongly agree to disagree strongly. (When the postulation deviates from their perception) to strongly agree (when the postulation is aligned with their understanding).

### 6.10.3. Part Three: Innovation Outcomes

The approach explores the potential innovation outcomes to recognize what the public sector can realize from diffusion of the innovation and to understand how it can create value from socio-economic and public services perspectives. According to the prior theoretical investigation conducted on the innovation and how it would affect the environment around the business; the researcher attempts to capture the actual correlation between innovation practices and the different potential change outcomes considering social setting, value and wealth creation and the enhancement of creative service delivery methods.

For this part, the researcher has developed 12 statements covering the three mentioned perspectives; in a way that each statement directing to specific public benefits, as shown in the following table:

Table 6.2: Innovation Outcomes Perspectives

| **Potential Outcomes** | | | **Statements** |
|---|---|---|---|
| Social | Human happiness (social members): | 1 | Happiness is an essential societal quality, as it fosters the nation's welfare, wealth accumulation, and invention |
| | Human happiness (employees): | 2 | Happy people are more optimistic, confident, and are willing to navigate untested environments to achieve goals and build sound institutions |
| | Social welfare: | 3 | Innovation is a crucial factor for ensuring economic growth, competitiveness, and the wellbeing of society |
| | Job creation: | 4 | Innovation creates jobs and gives people opportunities to utilize their potential while being active economic and social players |
| | | 5 | Innovation leads to the development of a talented workforce |
| Economical | Value and wealth creation: | 6 | Innovation leads to the nature of new sources of wealth |
| | | 7 | Innovation leads to financial optimization |
| | | 8 | Innovation leads to service performance improvement |
| | | 9 | Innovation leads to the discovery of the unmet needs of current and future generation |
| Public Service | Service, process and product improvement: | 10 | Innovation can be instrumental in enhancing products, services, and processes in the public sector |
| | Public service enhancement: | 11 | Innovation plays a significant role in encouraging and stimulating service improvement |
| | Employees Productivity: | 12 | Innovative and talented individuals are attracted to places where their talent is recognized, appreciated, and deployed |

### 6.10.4. Part four: Demographics

The concept integrates general element focused on specific characteristics of a population. It is frequently used by the researchers in empirical studies to trigger typical relevant information about any target audience; such as professional, educational and personal status. Remarkably, this would allow the researcher to confirm that the collected data correctly and identify the target audiences.

For this survey, the researcher used eight demographic questions. They are the type of the organization (public, private, and semi-government), size of the business, job status, work experience, educational level, age, gender, and nationality.

## 6.11. Measure

The researcher developed a structured questionnaire to collect data related to demographics, independent and dependent variables. The items of the independent and dependent sections are designed on a multiple choice basis, and 5 points scale in Likert format was used for measuring the variables as the following order; 1 for "strongly disagree", 2 for "disagree", 3 for "undecided", 4 for "agree" and 5 for "strongly agree". Whereas, for the demographic questions, the answers will be developed by the researchers based on the review of the similar study in the field.

## 6.12. Sample

Sample refers to a subset of the population that is selected for a particular study. The concept avails the subjects or respondents for which the research wishes to use to achieve the research objectives. Importantly, the population is picked based on factors such as conformity and availability.

### 6.12.1. Sampling Method

Sampling methods involve a process of choosing a representative from the overall selected population. This aspect is an integral part of the research methodology. Bryman (2015) adds that the process also involves choosing group respondents, elements, behavior or events with which to conduct the study. Simple random sampling involves stratified and straightforward methods. For the first one, each member of the identified population as an equal chance of being included in the final sample for the study. A complete list of the community is prepared to enhance equal representation. The latter is a sampling approach that selects members proportionally from each subpopulation or the stratum. The method applies when the study needs to cover a considerable population to achieve study requirements (Bryman and Bell, 2015). With the research targeting to assess the UAE public sector adoption of innovation, it's vital for the investigation to use a sample from the public sector who has expertise on innovation projects. The selected, stratified samples represent United Arab Emirates public sector. They cover the whole emirates, whereas the majority were from UAE Federal organizations and others from Abu Dhabi and Dubai local government.

The questionnaire is developed in a sense; the respondent should be aware of strategy development and innovation processes and understand the principles of project management. This led the researcher to use the sampling method of the stratified approach in which the data has been collected by means of distributing a questionnaire to the experts' or individuals who are responsible or knowledgeable in the mentioned fields. The applied concept ensured that the respondents understand the technicality of the questions and will improve the accuracy of collected data. To deploy such a sampling method, the researcher, therefore, used the LinkedIn application to ensure reaching out to the targeted group specifically by searching their current position and their previous experience. Also, the researcher had successfully accessed the database of local employees who have engaged with innovation strategy, attended workshops and leading the innovation and strategy functions in their organization.

### 6.12.2. Sample Size and Population

The researcher used the McClave et al. (2005) formula to compute the respondents sample size. The population of interest for this study includes employees working in innovation and strategy divisions within UAE public sector which consist of 45 federal entities and 229 local entities distributed among seven emirates, as total there are 274 public entities in UAE. The population that is accessible to this study consists of employees who have direct involvement with public oriented-organizations in developing innovation guideline and corporate strategic plan, participated in the process of idea formulation, evaluation and implementation, project portfolio selection and evaluation, project sponsors and managers who execute and manage the innovative projects listed in the developed strategic plan. Those professionals are the main targeted group within the 274 entities of this survey, however, it is difficult to estimate the exact number of population, as the number of experts who are knowledgeable of innovation initiatives in UAE public sector could be vary in each department, there is no public records for such data. Therefore, one could develop assumptions about number of experts in innovation initiatives in public sector. Thus, an estimate that innovation practices in the public sector 45 federal entities is well known to 5% of the professionals (p= 0.05), to achieve the target of a sampling error within 5% (SE= 0.05) at a confidence level of 95% [ (1-α) = 0.095; Zα/2 = 1.96 ], the minimum sample size would be:

$$s = \frac{(Z\alpha/2)^2 p(1-p)}{SE^2} = \frac{1.96^2(0.05)(0.95)}{0.05^2} = 73$$

Using the above formula of McClave et al. (2005), the minimum desirable sample size computed was 73 employees from different federal and local entities. According to Nigel et al.

(2007) surveys efficiency promotes the use of a random sampling technique to recruit participants. Therefore, the questionnaire was sent out by inviting targeted sample; and successfully reached to approximately 400 potential respondents using several communication channels including emails and social media applications requesting them to participate in the survey. The research conducted a search by title in LinkedIn application to invite the right potential respondents. For example, the words used in the search tap is "innovation," "strategy," "projects" and "PMO". This technique helped the researcher to find relevant public sector employees to participate in the survey.

Out of reached potential participants, 114 responses were returned in time, and only 79 of them are fully completed and applicable for further analyses. The outcome composed of 20% as a response rate (79 / 400 * 100 = 19.7%). The sample size of 79 is aligned with the acceptable range suggested by Bartlett et al. (2001), for the population size ranged between 1000 and 1500 (although in this study the population size is unknown) it is sufficient to have sample size from 79 – 110, as shown in table 6.3. This indicates a significance level was assuming that alpha level from $p$=0.1 to $p$=0.05 and a marginal error of 0.03. The application of Bartlett rules in determining acceptable sample size in survey research gives the researcher confidence to proceed with data analysis and interpretation.

Table 6.3: Minimum sample size for a given population (Bartlett et al., 2001, p.48)

| Population size | Sample size: Continuous data (margin of error=.03) alpha=.10 t=1.65 | alpha=.05 t=1.96 | alpha=.01 t=2.58 | Categorical data (margin of error=.05) p=.50 t=1.65 | p=.50 t=1.96 | p=.50 t=2.58 |
|---|---|---|---|---|---|---|
| 100 | 46 | 55 | 68 | 74 | 80 | 87 |
| 200 | 59 | 75 | 102 | 116 | 132 | 154 |
| 300 | 65 | 85 | 123 | 143 | 169 | 207 |
| 400 | 69 | 92 | 137 | 162 | 196 | 250 |
| 500 | 72 | 96 | 147 | 176 | 218 | 286 |
| 600 | 73 | 100 | 155 | 187 | 235 | 316 |
| 700 | 75 | 102 | 161 | 196 | 249 | 341 |
| 800 | 76 | 104 | 166 | 203 | 260 | 363 |
| 900 | 76 | 105 | 170 | 209 | 270 | 382 |
| 1,000 | 77 | 106 | 173 | 213 | 278 | 399 |
| 1,500 | 79 | 110 | 183 | 230 | 306 | 461 |
| 2,000 | 83 | 112 | 189 | 239 | 323 | 499 |
| 4,000 | 83 | 119 | 198 | 254 | 351 | 570 |
| 6,000 | 83 | 119 | 209 | 259 | 362 | 598 |
| 8,000 | 83 | 119 | 209 | 262 | 367 | 613 |
| 10,000 | 83 | 119 | 209 | 264 | 370 | 623 |

### 6.12.3. Consideration of Biases

In the survey, sampling bias is a tendency of the sampled statistics to either systematically over-or under-estimate a population parameter. The bias occurs when the study does not accurately represent the actual population. The standard bias results from the unrepresentative of the selected population. Arlt (2010) argues that the attributes give new assumptions that the sample is different from the targeted population. In some cases, members of respondents contradicting the methods become more obsessed with own believes and disregarding survey as confidential methods to air out their views. Thus, the potential results of the study become a source of biased estimates. In the current survey, such aspect was widely considered while selecting members from the UAE public sector departments to ensure standard estimate was achieved in areas where innovation was in the progression of adoption (Kasemsap, 2017).

The nonresponse bias under this level also involves already selected but unwilling to participate in the study. On the other hand, non-response bias is a phenomenon challenge that affects a researcher's outcome. With some selected population, this bias confirms the study results become non-representative. The rules governing most organizations ban unauthorized individuals from sharing organizations information. Therefore, the survey launched in most UAE public-based, in order not to suffer from a non-representation bias and to be aware of while setting the target population, the researcher considered the confidentiality of the received responses and approached the target population with covered letter clearly stating that "the data collected will be used solely for academic purposes". This paper will compute the most common or most recommended statistical remedies to be used before data analysis, the Harman's Single-Factor Test. It is the most common test that is carried out by the researchers to examine the common method variance in order to check whether a single factor is accountable for variance in the data (Shehnaz 2017). This test is done by using principal component analysis in SPSS.

## 6.13. Validity and Reliability Analysis

The validity is defined as the ability of a scale to measure what it is intended the overall outcomes. The primary purpose of running the reliability analysis is to achieve a higher level of consistency in the obtained results. In other words, it determines if the measurements assigned to each factor have consistency with identified outcomes (Yockey, 2011). This validation targets the scale used in the questionnaire and explores if it is reliability. On the other hand, validity analysis ensures the capability of test reviews accurately the designed measures of study instruments.

Generally, the validity test for research instruments evaluates the degree to which a survey can provide fundamental objectives of the study. Hogan and Leonard (2014) note that the expectation in this concept have the priority of gaining the general attention to ensure associated bias is at minimum levels. The reliability test keeps the urge to promoting consistent from the point of identifying population and collecting information. Therefore, with the need to check accuracy and applicability the scales of each study need the evaluation from reliability. The approach ensures preferred qualities of outcome emphasized give rise to complete consistent results that confirm the purpose of the research (David and Lori, 2011). The validity based on such aspect promotes genuineness of study. The authenticity of every step of the survey deployed instruments and analysis of data matters to the researcher and the examiners. Thus, accuracy becomes more of value to validity with reliability settling for precision to meet the study standards. Both tests are necessary for the instrument and the analysis process. Below are the list of conducted validity and reliability tests during the analysis process:

1) All of the survey scale statements were extracted from peer reviewed publications.
2) The validity of the data undertaken via univariate analysis to make sure that data is not random.
3) The descriptive analysis performed on the variables and data were validated for their normality distribution by measuring the central tendency of the data set using different analytical measures of location (mean, median, and mode), a measure of variability/spread (standard deviation) measures of shape (skewness, kurtosis).
4) Scale reliability performed using the method of Cronbach Alpha and reported initially on the instrument and then during the factor analyses which helps to improve the scale reliability and excludes the poorly loaded items from further investigation.

5) Factor exploration validity and reliability were tested using Cronbach's alpha coefficient, Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, and Bartlett's Test of Sphericity. KMO ensures the appropriateness of the factor analysis. While Bartlett's test indicates homogeneity of variances, meaning it explores if a sample is within an equal variation of the populations.
6) Tests were carried at the confidential interval 95 percentile and over.
7) Regression validity and reliability were also conducted by significance p values $<0.05$, homoscedasticity, P-P plot, and absence of multicollinearity using VIF values.

### 6.13.1. Instrument Validity and Reliability

While assessing the accuracy of the quantitative instrument, statistical validity and reliability tests can be conducted to ensure the effectiveness and consistency of the measurement device. Those tests are usually administered through a specialized statistical program such as SPSS which is the primary tool utilized during the analysis of the data in this research. However, with some techniques embedded in that statistical program, a content validity can be modified to achieve the highest degree or acceptable level of efficacy. On the other hand, the reliability of instrument can be measured by making the use of Cronbach's Alpha and split-half tests to indicate the consistency of the results across the items.

### 6.13.2. Validity Test of the Instrument

The validity of the instrument can be achieved when a particular scale or measure can rate what it intends to quantify. On this sense, the validity of a questionnaire is generally determined by conducting a reconnaissance survey. It is confirmed by a pre-test of the instrument with a smaller trial of standard features as the sample and or accessible population of the study (Mathers, 2007). The pretest process includes the subsequent analysis of the data collected and then the results compared with research questions and objectives. This will indicate if the questionnaire items agree with what they supposed to measure. The pretest can also provide opportunities to make modifications and adjustments to the questionnaire so that the details will appropriately measure issues they are meant to regulate.

External validity seeks to obtain population generalizability. It ensures that the result of the study is compatible and generalized to a sample of the population (WordPress.com). Further, validity ensures the appropriateness and the similarity among items within the instrument are maintained. The application of validity shows scientific traits since the researcher goes beyond mere value judgments and makes sure all measurement devices provide adequate coverage of the investigative questions (Hogan and Leonard, 2014). Notably, the face validity represents the purest exact form of the concept with basis on the normative conclusion of the researcher to consider whether the scale measures the real consistency of related study items. The idea is assessable in a pilot study (Arwa 2012). Therefore, the researchers in current studies take the pilot study to test the validity of the instrument.

The pilot study does not solely serve the study instruments to suggest a correction to the items or scale preliminary used by the researcher. Instead, it can target the research design and suggest improvements and the study process (Edwin and Vanora, 2001). According to them (p.1), "one of the advantages of conducting a pilot study is that it might give the warning about where the main research project could fail, where study protocols may not be followed, or whether proposed methods or instruments are inappropriate or too complicated".

Theoretically, many kinds of literature emphasize the importance of pilot study as it increases the likelihood to achieve successful results and to provide valuable insights for other researchers. Whereas, empirically pilot studies are likely to be underused and underreported as the complete report of the pilot studies is rarely conducted in the researches (Vanora et al. 2001). However, when reported researchers often justify the research methods only or refer to one element of the pilot study such as; pre-testing of a questionnaire.

Due to time constraint, conducting a complete pilot study is not possible with current research. However, and as the researcher of the present thesis realizes the importance of holding the pilot study for better results and validity purposes, thus; the developed questionnaire was sent to 8 professionals in the field of UAE public sector innovation and strategic planning and execution. This is mainly to confirm the questionnaire validity and ensure the selected methods and the research process are appropriately performed and structured. As a result, adjustments were made on the questionnaire to reflect the collectively gathered feedback from the pilot study. Those adjustments were mainly changing to the way of explaining the statements, simplifying the words and combining similar comments.

### 6.13.3. Reliability Test of the Instrument

In this research, the method of Cronbach Alpha is used as a preliminary analysis tool for the reliability test of the instrument. It is the most popular method used in testing the reliability of the device. The primary objective of using Cronbach Alpha method in quantitative studies is to weed out the poor questions and provide solid evidence of its authenticity. This will help the researcher develop a valid, coherent set of problems for the designed instrument and as a conclusion can prove that the generated data have a solid foundation.

According to Anne (2011), reliability is measured on a scale from 0 to 1 with higher scores indicating greater consistency and 0 is not reliable. While the value of 0.75 and above is generally considered good, and a value above 0.9 is an optimum result; something desired to in quantitative studies, a researcher looking forward to it. Cronbach's Alpha is calculated by the following formula which is derived from the mean of the correlations between all pairs of items (r) and the number of issues (n): Alpha = n x r / (1 + (n -1) x r).

Table 6.5 shows the terminology for the study variables. The same coding was computed for the variables in the SPSS to make the analyzing process easy and help the researcher to indicate the factors through unique nomenclatures.

Table 6.5: Nomenclature for study variables

| | |
|---|---|
| **IPM** | **Innovation Performance Measurement** |
| PLM | Project Level Measurements |
| PrLM | Program Level Measurements |
| PoLM | Portfolio Level Measurement |
| SLM | Strategy Level Measurements |
| GCLM | Government Council Level Measurements |
| **IS** | **Innovation Skills** |
| KSS | Knowledge Stage Skills |
| PSS | Persuasion Stage Skills |
| DSS | Decision Stage Skills |
| ISS | Implementation Stage Skills |
| SSS | Scaling-up Stage Skills |
| **IO** | **Innovation Outcomes** |
| SO | Social Outcomes |
| EO | Economical Outcomes |
| PSO | Public Service Outcomes |
| **Org_Type** | **Type of your organization** |
| **Org_Size** | **Size of your organization (employees' number)** |
| **Job_Level** | **Job Level** |
| **Experience** | **No. of total years of work experience** |
| **Education** | **Educational level** |
| **Age** | **Age** |
| **Gender** | **Gender** |
| **Nationality** | **Nationality** |

## 6.14. Analytical Techniques

The concept involves specific measures put in place in the course of the research to help the researchers examine the complex rationale that does exist between the studied variables. The techniques are more statistical involving regression analysis, Grouping methods, and multiple equation models. Therefore, their application ensures dependent and independent variables get some link to ensure the reliability of the study.

### 6.14.1. Descriptive Statistics:

In this section, the data has been validated for its normality distribution by measuring the central tendency of the data set. The descriptive analysis for numeric variables examined using different analytical measures of location (mean, median, and mode), a measure of variability/spread (standard deviation) measures of shape (skewness, kurtosis). The location describes the central pinpointed data, whereas the variability measures how do the statistics vary from the central point, and measures of the shape indicate where the majority of the figures are plotted. The followings are the explanation of those measures:

- **Mean:**

  The concept refers "average" and it is mainly affected by important values (called: outliers). The mean can be calculated by adding up all the data points and then dividing them by the total number of data points.

- **Median:**

  The value pointed in the middle when the data are arranged in order of increasing importance. It is calculated by ordering the data from smallest to largest and then the median is the middle value (for an odd number of data points), or can be an average of the two intermediate values (for even number of data points).

- **Mode:**

  The most frequent value occurred among the data points.

- **Standard Deviation:**

  It is the most common measurement for the data spread. The difference shows the variation of each data points from the mean value. On the other hand, the standard error is measuring how precisely the mean has been allocated in the data set. The standard deviation is significantly affected by the outliers; similar to the mean. Thus, a small value of **standard deviation** means that the values in a statistical data set are close to the mean. Whereas, a significant **standard difference** implies that the values in the data set are farther away from the mean. Statistics usually refer to 68 95 99.7 rule in defining the standard deviation. This rule is explained as follows:

  - 68% of the data fall within one standard deviation away from the mean value.
  - 95% of the data fall within two standard deviations apart from the mean value.
  - 99.7% (almost all data) – fall within three standard deviations away from the mean value.

  Typically, normal distribution can be confirmed when 68% of the values are within the range of a ±1 standard deviation from the mean.

- **Skewness:**

  The extent to which a distribution deviates from symmetry around the mean. A skewness value between +1 is considered excellent, but a value between +2 is acceptable in statistics science. A 0 value represents a symmetric or equally balanced distribution. However, when the peak is to the left, a positive skewed value occurs. When the peak is to the right, a negative skewness is likely to occur, as shown in figure 6.3. Fisher's skewness coefficient indicates the following values (David and Lori 2011):

- > 1.00 moderate right skewness
- > 2.00 severe right skewness
- < -1.00 moderate left skewness
- < -2.00 severe right skewness

- **Kurtosis:**

  A measure of the peakedness or flatness of a distribution. Normal distribution shape has a kurtosis value near to the 0. A positive value indicates more peaked than normal, while a negative kurtosis indicates a shape flatter than normal. Similar to the skewness, a value between +1 is considered excellent, but a value between +2 is acceptable in statistics science.

For the data interpretation, the researcher will use the mean to describe the sample with a single value that represents the center of the data. Many statistical analyses use the mean as a standard measure of the center of the distribution of the data. The median and the mean both measure central tendency

There is an empirical relationship exists between mean, median, and mode. For a moderately skewed distribution, it is: If a frequency distribution has a symmetrical frequency curve, the mean, median and mode are equal.

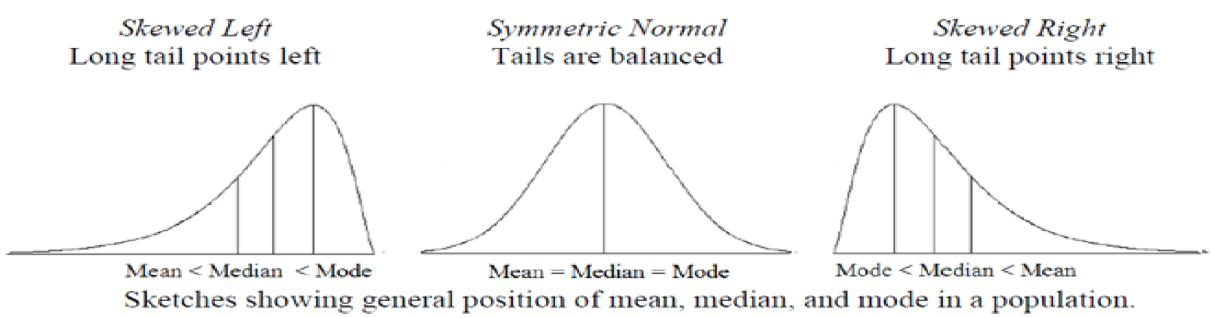


Figure 6.3: The General position of mean, median, and mode in population (David & Lori 2011)

### 6.14.2. Factor Reduction

Factor analysis is a statistical method aims to find independent latent variables by describing the variability among observations and discover a correlation between a set of measured variables (Widaman 1993). It is a technique that is used for data reduction to a small set of summarized variables to explore precisely the interdependencies between observed variables. Statistics perform factor analysis test to examine unobserved correlated variables that have not been found initially by the researcher, those unobserved variables called factors. The theory behind factor analysis is that the variation in observed variables could be mainly reflected and explained by the variety of other unobserved/underlying variables. Therefore, performing factor analysis test will help in the inclusion of relevant variables into a joint group and, and ensure that there is an exact correlation between variables and factors (Fabrigar et al. 1999). For this study, factor analysis will be performed to ensure the dimensionality and proper loading of instrument's items and to reduce the number of variables in a dataset.

### 6.14.3. Correlation

The correlation coefficient is the measure that shows how strongly two variables related to each other or determines the relationship of two variables regarding the degree of their association movements. The values for the correlation coefficient is ranged between -1.0 to 1.0. The value 1.0 indicates a perfect positive correlation. This means as the values of one variable increase, the amount of the other variable increase. A value of -1.0 represents a perfect negative relationship. This is an opposite direction of correlation, which means as the benefits of one variable expansion, the values of the other variable decrease. The amount of 0 indicates no statistical evidence of the relationship between the two variables. Thus, the absolute value of the correlation coefficient indicates the strength of the relationship between the two variables, while the factor significant points out in the direction of the observed association.

The correlations are significant at the 1% level ($p < 0.01$) shown by ** next to the value, or significant at the 5% level ($p < 0.05$) demonstrated by * next to the value (Anne, 2001). The difference between Pearson and Spearman correlation is that Pearson has some conditions like; data comes from normal distribution, points are evenly distributed (homoscedasticity), and the relationship is linear. Spearman is a nonparametric statistic and does not apply that mentioned condition. Therefore, Spearman becomes a preferable method if those conditions are not met (Anne, 2001). Practically, both correlations lead to the same conclusion. Importantly, to ensure a higher correlation value, this study used a Spearman correlation method; it is also called "Nonparametric Correlations". While the correlation type is used in this research paper is Bivariate Correlation.

### 6.14.4. Regression

Regression is the technique for prediction of one variable from another. In it is the uncomplicated form, regression is used to predict values of one variable from the benefits of another variable by using a straight line (linear) equation.

As discussed earlier that the correlation coefficient measures the strength of the linear association as a single number and has no distinction drawn between the two variables, also has no causation implied. Therefore, there is a need to quantify the relationship between two continuous variables and use those relationships to make predictions; this can be articulated by given the value of one variable to predict the value of the other variable. The analyses will be applied by using the linear regression analysis. One variable is regarded as a response (dependent

/ outcome variable) to the other predictor (dependent / explanatory variable), and the value of the predictor variable is used to predict what the response would be. For the best of the data analyses, this research paper used entry method of "Backward" or sometimes named as backward deletion, it is the reverse process which enters all variables at once, and then it removes one at a time till no significant improvement arises.

In the regression analyses, the interpretation of data resulted from performed tests will mainly consider the following outputs:

- Model Summary: This table summarizes the regression model was indicating the significance of predictors and explains the variations between predictor variables and the response (dependent) variable.
    - R-square: It represents the degree of data variation in the estimated equations. The value of R-square evaluates the goodness of fit of the measured regression equations.
    - Adjusted R-square: Attempts to adjust the R-square according to the number of predictors in the model and sample size. Thus it can be referred to as the modified version of R-square.
- ANOVA: The Analysis of Variance known as the ANOVA (ANalysis Of VAriance). It is mostly used to explain the variances between categories' means in the data.
    - F-Ratio: Tells if the model explains a significant amount of the variance in the dependent variable.
    - Sums of Squares: explains the sum of the square of variation or the total amount of variability in the response.
    - DF: This stands for degrees of freedom that each sum of squares associated. DF is one less than the number of observations (n-1).

- Mean Squares: It is the Sums of Squares divided by the corresponding DF.

- Coefficients: Explains how much the dependent variable is expected to change when there is one unit of alteration in the independent groups, this applies to hold all other considerations constant. The Unstandardized coefficients used in the prediction and interpretation, while the standardized coefficients used for comparing the effects of predictor variables.
  - Beta coefficient: it compares the strength of the effect of each predictor variable to the dependent variable. If B coefficient showing positive value, then the relationship of this variable with the dependent variable is positive, while if the B coefficient is showing a negative value, then the connection is negative.
  - VIF: It stands for the variance inflation factor; the role is no VIF exceeds 10.0.
  - Tolerance: It indicates for inconsequential collinearity between the variables, and the role is that collinearity does not explain more than 10% variance of any predictor variables.

- Collinearity Diagnostics: collinearity is termed for the event when there is a correlation between the mediator variable and the independent variable as the mediation arises from the first factor. Multicollinearity termed for the fact where the independent variable explains all the variation caused by the mediator variable and with no single change illustrates the dependent aspects. Therefore, collinearity and multicollinearity are generally expected in the mediational analysis, and that cannot be avoided by the researcher.
  - Eigenvalues: It gives an indication of how many distinct dimensions there are among the predictor variables. The closer eigenvalues to 0, the high inter-correlation between variables. This means a small change to the data values could lead to substantial changes in the estimates of the coefficients.

- Condition Index: This method is used to flag extreme collinearity in the data. Though, a condition index of over 15 may indicate possible collinearity problems, whereas an index greater than 30 may suggest serious collinearity problems.
- Variance Proportions: This is being looked at when a high condition index is captured for a particular dimension. It gives attention to the variables with two or more variance proportion of .05 or higher particularly for the components with top condition index. Those components have high linear dependence in which affected by multicollinearity problem. With such an effect, a small amount of change to the data may lead to a considerable change or errors in the regression analyses. However, as a rule of thumb, the findings of variance proportions can be ignored if the tolerance and VIF values do not indicate multicollinearity.

- Residuals Statistics: The table of residuals statistics explains the difference between data points and the regression line, sometimes termed as "errors". This doesn't mean there is something wrong with the data analysis; instead, it just points out at the unexplained difference. In particular, this test reports descriptive statistics for the predicted and residual values. It examines the linearity between dependent and independent variables concerning homoscedasticity, independence, and normality of data.
    - Histogram: The plotted histogram of the standardized residuals assessing the symmetry and normality distribution of residuals. The overall pattern of the residuals values should be similar to the bell-shaped profile.

The standard P-P plot of regression standardized residual: This graph shows the residuals on the vertical axis and the independent variable on the horizontal axis. It displays how much variation explained by the fit in the data, and how much leftovers in the residuals. When there is a great spread of the residuals in the plot, rather than the range of the centered fit, this indicates inappropriateness of the model.

### 6.14.5. Mediation

Mediation hypotheses create a factors relationships by demonstrating how an independent variable (X) affects a dependent variable (Y) through various potential intervening variables, or mediators (M). This study address only the situation in which the causal order of X, M, and Y can be established on theoretical or technical settings (Kristopher & Andrew 2008). Where the logical ordering of X, M, and Y cannot be established, other methods recommended investigates mediation (e.g., Azen 2003). Due to the fact that this study is based on the multiple mediator models. Structures that consider the effect of more than one mediator in a relationship is referred to as multiple mediators. The commonly used model is the causal steps strategy, popularized by Baron and Kenny (1986), in which the investigator estimates the paths of the concept using Least Squares regression (OLS) regression, and rates the extent to which the desired criteria is met. Baron and Kenny (1986) model and equations are described in figure 6.4:

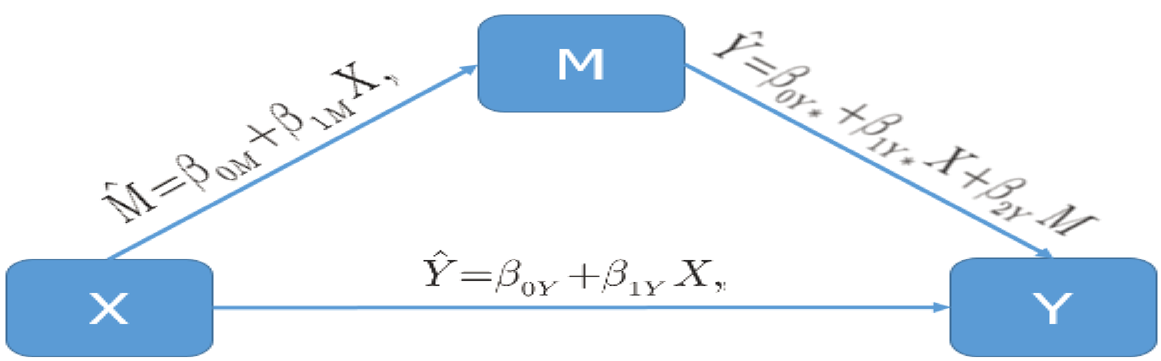


Figure 6.4: Conceptual Path Diagram of the Mediation Analysis

The mediation model is defined by three equations. First, the basic model which presents overall effect of X (the primary predictor variable) on Y (dependent varirable) is:

$$\hat{Y} = \beta_{0Y} + \beta_{1Y} X,$$ Equations (1)

The above equation depicting the overall effect of the basic model represents the relationship between X and Y while excluding M (mediator). The bottom configuration set in figure 6.4 shows the overall effect (specifically the β1Y regression coefficient) as a solid line. Notably, the overall effect regression equation in the top panel combines the direct and indirect impact into a single regression coefficient. This effect is important as it plays a decisive role in defining some of the test statistics and impact outcomes in a developed mediation model. Importantly, the mediation model is applied through two regression equations to decompose the overall effect into its direct and indirect components as follows.

$$\hat{Y} = \beta_{0Y*} + \beta_{1Y*} X + \beta_{2Y} M$$ Equations (2)

$$\hat{M} = \beta_{0M} + \beta_{1M} X,$$ Equations (3)

Equations 2 represent the effect of the mediator on the outcome controlling for X. While equation 3 is the effect of the independent variable on the mediator.

In the regression analyses, global factors “G” were computed for the mediator variables considering the results of factor analysis, therefore the multiple mediator factors of innovation skills is presented as followings: GKSS = KSSN1 + KSSN2 + KSSN3; GPSS = PSSN1 + PSSN2; GDSS = DSSN1 + DSSN2; GISS = ISSN1 + ISSN2; GSSS = SSSN1 + SSSN2.

## 6.15. Research Structure

This research went through a structured process to create a consistency approach during the in the analyses part of the study. Figure 6.5 summarizes how the research is structured and analyzed throughout the different stages.

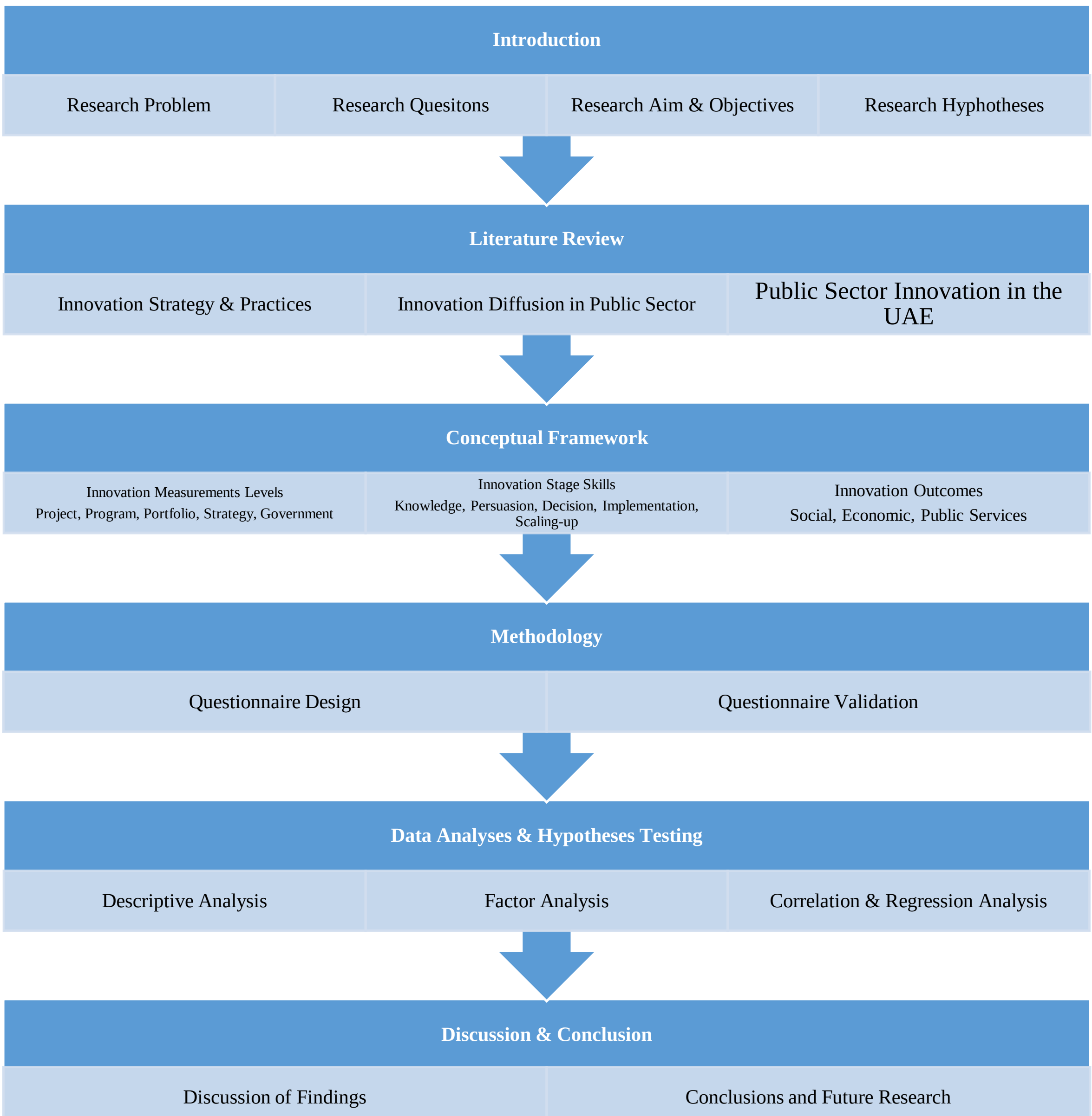


Figure 6.5: Research Analysis Design

## 6.16. Ethical Considerations

It is often assumed that formalizing the ethical rules is essential in social science studies to distinguish between acceptable and unacceptable behaviors. In any research stage, ethical concerns may arise, and there will be ample opportunities that the researcher should act using his/her sense of right and wrong. People usually learn moral norms during their interaction in different social settings. The paramount importance is that qualitative studies need more attention to ethical concerns due to the subjectivity nature of the research. Practically, qualitative studies exert personal involvements between researcher and participants. Such kind of interaction between the two parties can be ethically challenging as the researcher has to evaluate what has been observed or perceived and then interpret it from his point of the stand. On the other hand, researchers believe quantitative studies may impose more moral credibility as there will be fewer subjective elements of errors and less human interaction. Informed consent has become a vital part of study ethics in any research involving human subjects, and the author developed one for the sake of this study. This form will inform the survey's participants that their role in the review is voluntary and they have all the rights to withdraw from the study at any time without any consequences. Besides, the research aim was explained to the participants in the questionnaire's invitation. It is explicitly mentioned that the data collected will be solely used for academic studies purposes. This is mainly to increase the level of confidence for anyone responding to the questions and to ensure that the answers reflect the reality in collected surveys.

Moreover, the researcher will sign on the research ethics approval documents before commencing the research study and declare on the university’s code of conduct for research. This document would give the researcher a sufficient level of confidence that the research topic and investigative aspects are not associated with high risk, and they are accepted by the university's management and ethics committee.

Confidentiality is an essential element to consider particularly like legal studies research. As a result, the researcher ensures that the research finding and the drawing conclusion will not harm the study participants and others not involved in the study, and more generally would not violate accepted research practice.

## 6.17. Limitations

In this research study, the reader should understand the boundaries of the conducted research from the author's point of view. The process of articulation particular research study, usually creates an opportunity for more generated questions that need to be further explored, however, they are not considered within the specific context and scope of existing research. Those opportunities might be regarded as by other interested researchers to conduct further investigation of the related questions.

The need to bridge innovation skills and preferred across the study is less discussed with the researchers being more specific on some attributes. Whereas, exploring the relationship of innovation practices and skills and finding their association with potential innovation outcomes of the public sector is the exciting part of this exploratory research. The literature in this study has minimal relevant studies to be referred to as a source of review for this thesis. Although this can be a barrier to pursue the current research project, the completed research with its findings and developed framework, in particular, will defiantly add value to the existing body of knowledge.

Concerning the current research, it is essential to shed light on the selected population and samples within the context of the public sector. Readers need to understand that the results of this study incorporated from institutions that are principally shaped and operationalized by its strategic plans and at least raised the awareness of innovation and creativity among their people. This limitation has been applied due to the technicality of the developed questionnaire, in which people from another area of knowledge might find some difficulties in understanding the meaning of the statements and what each attempts to measure.

## 6.18. Summary

In conclusion and as elaborated earlier, this research is designed to validate proposed hypotheses, and therefore the positivist philosophical approach decided to be an ideal position for this research design. The suitable research method and design fall in line with the aim of this study in which a questionnaire developed as a primary instrument for data collection.

Also, the study is carried forward considering the use of deductive approach because the research is designed from general theories to a particular situation and to achieve specific findings within public sector context underlying the economics' growth, diversification in innovative services and contributing socially to enhanced community services projects. Therefore, the chapter concludes that the extent to which research findings can be generalized to the other sectors or regions that need further investigation.

# 7. CHAPTER SEVEN: DESCRIPTIVE ANALYSES

## 7.1. Introduction

This chapter creates an in-depth discussion of the general information gathered from participants. The data captured on the questionnaires is the primary source of reference to keep the objectives of the study on track. Additionally, the chapter computes the common method bias, shows the results of reliability analyses. Finally the chapter provides descriptive statistics of research main constructs and explains the demographic characteristics of the study participants.

## 7.2. Common Method bias:

Harman's Single-Factor Test computed to test common method variance in the collected data (Shehnaz 2017). In this test all the questionnaire items (exception for demographic data) were loaded into extraction method in SPSS using the Principal Component Analysis (PCA). Table 7.2 demonstrate the output of the computed test. The generated PCA output revealed 116 distinct factors accounting 85% of the total variance. The first un-rotated factor captured 22% of the variance in data. Thus, the results indicate that the two underlying assumptions did not meet, i.e. no single factor emerged and the first factor did not capture most of the variance. Therefore, the results of this test support the evidence that common method variance is not an issue in this research study.

Table 7.2: Common Method Variance

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 26.030 | 22.440 | 22.440 | 26.030 | 22.440 | 22.440 |
| 2 | 15.324 | 13.210 | 35.650 | 15.324 | 13.210 | 35.650 |
| 3 | 4.628 | 3.990 | 39.640 | 4.628 | 3.990 | 39.640 |
| 4 | 4.211 | 3.630 | 43.270 | 4.211 | 3.630 | 43.270 |
| 5 | 3.726 | 3.212 | 46.482 | 3.726 | 3.212 | 46.482 |
| 6 | 3.590 | 3.095 | 49.577 | 3.590 | 3.095 | 49.577 |
| 7 | 3.232 | 2.786 | 52.362 | 3.232 | 2.786 | 52.362 |
| 8 | 3.027 | 2.609 | 54.972 | 3.027 | 2.609 | 54.972 |
| 9 | 2.789 | 2.404 | 57.376 | 2.789 | 2.404 | 57.376 |
| 10 | 2.641 | 2.277 | 59.653 | 2.641 | 2.277 | 59.653 |
| 11 | 2.373 | 2.046 | 61.699 | 2.373 | 2.046 | 61.699 |
| 12 | 2.196 | 1.893 | 63.592 | 2.196 | 1.893 | 63.592 |
| 13 | 2.186 | 1.884 | 65.476 | 2.186 | 1.884 | 65.476 |
| 14 | 2.072 | 1.786 | 67.262 | 2.072 | 1.786 | 67.262 |
| 15 | 1.908 | 1.645 | 68.907 | 1.908 | 1.645 | 68.907 |
| 16 | 1.825 | 1.573 | 70.481 | 1.825 | 1.573 | 70.481 |
| 17 | 1.733 | 1.494 | 71.974 | 1.733 | 1.494 | 71.974 |
| 18 | 1.635 | 1.409 | 73.383 | 1.635 | 1.409 | 73.383 |
| 19 | 1.586 | 1.367 | 74.750 | 1.586 | 1.367 | 74.750 |
| 20 | 1.486 | 1.281 | 76.031 | 1.486 | 1.281 | 76.031 |
| 21 | 1.398 | 1.205 | 77.236 | 1.398 | 1.205 | 77.236 |
| 22 | 1.375 | 1.185 | 78.421 | 1.375 | 1.185 | 78.421 |
| 23 | 1.314 | 1.133 | 79.554 | 1.314 | 1.133 | 79.554 |
| 24 | 1.265 | 1.091 | 80.645 | 1.265 | 1.091 | 80.645 |
| 25 | 1.189 | 1.025 | 81.670 | 1.189 | 1.025 | 81.670 |
| 26 | 1.175 | 1.013 | 82.683 | 1.175 | 1.013 | 82.683 |
| 27 | 1.131 | .975 | 83.658 | 1.131 | .975 | 83.658 |
| 28 | 1.056 | .911 | 84.568 | 1.056 | .911 | 84.568 |

Extraction Method: Principal Component Analysis

## 7.3. Reliability Analyses

It is imperative that the factor should demonstrate a high level of homogeneity to ensure internal consistency of all measures. As a result, the set of designed tests share a high similarity and show perfect inter-correlation. Cronbach's Alpha provides the researchers with an overall reliability coefficient for a set of variables. Therefore, it is selected in this paper as a useful assessment tool to a proof internal consistency level of the devised measurement with a minimum acceptable cut-off point of 0.7.

As it indicates in table 7.3, the actual Cronbach's Alpha for the overall study (116 items) is .0966. Fortunately, the general results of the reliability analysis using Cronbach's Alpha test support all of the factors' measurement set ranged between .828 and .932. This represents an excellent reliability value, which means the data has captured a high level of internal consistency for the scale. However, the researcher computed reliability test at factor level using the option of "Alpha if deleted". This is mainly to demonstrate if the internal consistency can be further improved. It can be performed merely by deleting unsupported measures from the set. According to the figures in table 7.3, there are no further improvements can be occurred by eliminating incompatible items. Therefore, all of the study measures passed the reliability test, as all values of Cronbach's Alpha accounted greater than 0.7 and by now the researcher has reached too high satisfaction and confidence level to pursue with next stage of data analysis part.

Table 7.3: Results of Cronbach Alpha test for the study measures

| Factor | Code | Item | Alpha if deleted | Cronbach Alpha |
|---|---|---|---|---|
| **Project Level Measurements** | PLM1 | People are encouraged to submit ideas in your organization | .810 | **.828** |
| | PLM2 | We generate and prototype new project ideas | .803 | |
| | PLM3 | We can use work time to work with others on project ideas | .804 | |
| | PLM4 | We capture the lessons learned from our projects | .755 | |
| | PLM5 | We involve our stakeholders very closely with our business so that we all fully understand their project needs | .795 | |
| | | | | |
| **Program Level Measurements** | PrLM1 | Lessons learned from projects are shared among the program | .891 | **.898** |
| | PrLM2 | Team members stay up-to-date of the most current knowledge within their field of work | .871 | |
| | PrLM3 | At the program level, we can take "acceptable risks" when necessary | .866 | |
| | PrLM4 | The culture at the program level encourages risk-taking and collaboration efforts to implement new ideas | .871 | |
| | PrLM5 | Information about successful ideas is shared between projects and between program team members | .882 | |
| | | | | |
| **Portfolio Level Measurement** | PoLM1 | Ideas in the portfolio are evaluated to ensure the balance of projects regarding their timing, technical complexity, expected market impact, and risk level | .873 | **.888** |
| | PoLM2 | Employees participate in important decisions taking on new ideas | .888 | |
| | PoLM3 | The constructive and critical analysis is conducted to determine if full implementation of an idea is viable | .855 | |
| | PoLM4 | The suitability of the idea is checked against the indicators of success | .868 | |
| | PoLM5 | Indicators to assess innovation results are defined | .860 | |
| | PoLM6 | Information about successful ideas is shared among innovation project portfolio | .866 | |
| | | | | |
| **Strategy Level Measurements** | SLM1 | Strategies are clear enough that we can translate it into innovation initiatives | .915 | **.926** |
| | SLM2 | Strategies match well with the way the market is evolving | .921 | |
| | SLM3 | Approaches exist to ensure ideas are aligned to strategy before implementation | .920 | |
| | SLM4 | Top management foster a culture that supports innovation | .923 | |

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| | SLM5 | Top management have a clear innovation vision and strategy | .916 | |
| | SLM6 | Top management ensure that roles and responsibilities are appropriately assigned and communicated | .918 | |
| | SLM7 | Innovation objectives exist at relevant functions and levels, which are consistent with the innovation vision and strategy | .923 | |
| | SLM8 | Team members are free to bring ideas forward, regardless of their formal position | .923 | |
| | SLM9 | Innovation process consists of structured and explicit methods to develop new ideas and transform them into innovation value with the quality and timelines to achieve the results | .920 | |
| | SLM10 | Innovation-specific recognition and reward systems are established | .923 | |
| | SLM11 | There is a strong diffusion network between the opinion-leader and the change agent who influences innovation decisions | .918 | |
| | SLM12 | Information about successful ideas is shared within the organization and among the strategic partners | .919 | |
| | | | | |
| **Government Council Level Measurements** | GCLM1 | Our innovation project has successfully addressed a significant problem of public concern in the government sector | .878 | **.900** |
| | GCLM2 | Our innovation project, or aspects of it, has shown promise of being spread or replicated by other government entities | .864 | |
| | GCLM3 | Diffusion of innovation strategy has added value, saved costs and generated new revenues across the government departments | .886 | |
| | GCLM4 | Projects and programs are related to the objectives and goals of the government strategy and achieve economic value on the national level | .885 | |
| | GCLM5 | Information about successful ideas is shared with other governments | .875 | |
| | | | | |
| **Knowledge Stage Skills** | KSS1 | Creativity can be fostered by removing barriers to knowledge-sharing | .846 | **.854** |
| | KSS2 | Idea formation skill helps individuals to generate innovative ideas | .848 | |
| | KSS3 | Evaluating ideas is based on a predetermined cost-benefit analysis | .852 | |
| | KSS4 | Problem-solving is approached from an innovation perspective | .852 | |
| | KSS5 | Curiosity is a prerequisite for knowledge searching | .844 | |
| | KSS6 | Insights drive individuals to seek realistic improvement opportunities | .841 | |

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| | KSS7 | Inquisitiveness for opportunity catalyses the acquisition of awareness knowledge | .840 | |
| | KSS8 | Inquisitiveness for opportunity builds resourcefulness for knowledge modification and application | .842 | |
| | KSS9 | Adventure in trying out new approaches facilitates knowledge-search | .847 | |
| | KSS10 | Openness to new approaches expands opportunities | .846 | |
| | KSS11 | Ability to explore new ventures catalyses the creation of knowledge | .838 | |
| | KSS12 | The capacity to explore ideas catalyses problem-solving | .843 | |
| | KSS13 | Teamwork fosters risk-sharing leading to the better generation of ideas | .839 | |
| | KSS14 | Communication improves knowledge sharing and diffusion | .848 | |
| | KSS15 | Continuous improvement facilitates knowledge improvement | .843 | |
| | | | | |
| **Persuasion Stage Skills** | PSS1 | The presence of relationship skills facilitates the individual to search for feedback from multiple stakeholders | .869 | **.876** |
| | PSS2 | Persuasion skill helps individual to assess the innovative idea using enabler factors | .863 | |
| | PSS3 | Persuasion skill improves individual ability to build new idea based on accurate information | .864 | |
| | PSS4 | Collaboration helps the individual to understand the innovative idea better | .863 | |
| | PSS5 | A pursue of a team approach to information search, returns a more abundant variety of ideas | .860 | |
| | PSS6 | Problem-solving skills enable the individual to persevere in searching for innovative ideas | .865 | |
| | PSS7 | Communication skills improve the efficacy of the information-search process | .865 | |
| | PSS8 | Multi-cultural competence enables the individual to follow information from different cultural contexts | .889 | |
| | PSS9 | An entrepreneurial mind-set induces the individual to focus on the possibilities, not the challenge | .882 | |
| | PSS10 | Sociability creates a more welcoming environment for individuals with information to share | .861 | |
| | PSS11 | Problem visualization can empower individuals to pursue innovative ideas | .866 | |
| | PSS12 | Lateral thinking makes the individual more resourceful with the available information | .865 | |

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| | PSS13 | Lateral thinking makes the individual more likely to pursue innovative ideas because they can think beyond the obstacles | .860 | |
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| **Decision Stage Skills** | DSS1 | Understanding the risks associated with innovative idea increases the chance of adopting the concept | .856 | **.854** |
| | DSS2 | Smart and diligent individuals spend more time on the evaluating of potential innovation compared to those researchers with generalized perception. | .850 | |
| | DSS3 | Being proactive in the innovation idea catalyses the decision-making process | .845 | |
| | DSS4 | Teamwork enriches the decision process | .848 | |
| | DSS5 | Problem-solving skills catalyse the decision process | .843 | |
| | DSS6 | Communication of risk enrich the decision on adopting new ideas | .837 | |
| | DSS7 | Decision-making power facilitates the adoption of new ideas | .846 | |
| | DSS8 | Unbiased thinking leads to the selection of the most realistic choice | .844 | |
| | DSS9 | Incubation techniques influence the degree to which the innovation meets the expected outcomes | .838 | |
| | DSS10 | Modeling concepts provide adequate simulation to make informed decisions | .837 | |
| | DSS11 | Prototyping efficiently exposes the real-world efficacy of the decision by testing it accordingly | .841 | |
| | DSS12 | Understanding and manipulating information sets facilitate more accurate forecasting for the performance of the innovation | .846 | |
| | DSS13 | The presentation of the argument for and against the decision facilitates informed buy-in or resistance | .842 | |
| | | | | |
| **Implementation Stage Skills** | ISS1 | Implementation skill helps adapt the right tools and technologies to complete a task, project, or assignment | .865 | **.874** |
| | ISS2 | Employees must be tenacious and persistent to the innovation implemented | .876 | |
| | ISS3 | Relationship-building skill encourages knowledge-sharing during the implementation of the innovative idea | .865 | |
| | ISS4 | Accountability fosters stakeholder adoption of innovation | .864 | |
| | ISS5 | Performance measurement encourages the adoption of innovation | .870 | |
| | ISS6 | Planning shows the level of fit between the innovation and its usability | .863 | |

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| | ISS7 | Coordination streamlines implementation processes to improve value chain efficiency | .865 | |
| | ISS8 | Teamwork provides the opportunity to successful implementation of new ideas | .865 | |
| | ISS9 | Problem-solving skills assist in eliminating obstacles for innovation implementation | .861 | |
| | ISS10 | Ability to communicate issues generates opportunities in the implementation from multiple perspectives | .863 | |
| | ISS11 | Creative abilities have a positive impact on innovation quality | .864 | |
| | ISS12 | Risk-taking skills enable the implementers to continue with the process and therefore transcend challenges | .861 | |
| | ISS13 | Managerial skills influence the rates of accountability and delegation | .868 | |
| | ISS14 | Managerial skills determine the efficacy of teamwork in innovation implementation | .866 | |
| | ISS15 | The level of cohesion between the team determines the success of the implementation | .871 | |
| | | | | |
| **Scaling-up Stage Skills** | SSS1 | The managerial approach determines stakeholder involvement in scaling-up | .906 | **.910** |
| | SSS2 | The managerial approach an influences the risk which is acceptable in scaling-up | .908 | |
| | SSS3 | Team cohesion determines the team's divergence on scaling-up | .905 | |
| | SSS4 | Emotional intelligence exposes the stakeholders' perception about the scaling-up of the adopted innovation | .908 | |
| | SSS5 | Endurance to obstacles provides a foundation on which the implementers can scale-up the adoption of innovation | .904 | |
| | SSS6 | Openness on new ideas and continuous improvement assist in the scaling-up process | .904 | |
| | SSS7 | Sharing information and expertise inside the organization helps in the scaling-up process | .902 | |
| | SSS8 | Negotiation skill overcomes barriers among people that may hinder the scaling-up of the innovation | .904 | |
| | SSS9 | Individuals with negotiation skill provide sources for assisting the scale-up process | .904 | |
| | SSS10 | Delegating responsibility and providing support improve the chance of the scaling-up success | .902 | |
| | SSS11 | Collaboration makes it easy for the scaling-up process | .904 | |
| | SSS12 | Collaborative efforts facilitate the allocation of resources for networking and sharing ideas, knowledge, and skills to improve the scaling process | .901 | |

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|---|---|---|---|---|
| | SSS13 | Recognizing opportunities for change and improvement facilitates the scaling process | .897 | |
| | SSS14 | The existence of the continuous improvement ethos facilitates the scaling process | .902 | |
| | SSS15 | Accepting feedback and learning from experience and mistakes leads to scaling-up innovative ideas successfully | .902 | |
| | | | | |
| **Innovation Outcomes** | SO1 | Happiness is an essential societal quality, as it fosters the nation's welfare, wealth accumulation, and invention | .931 | **.932** |
| | SO2 | Happy people are more optimistic, confident, and are willing to navigate untested environments to achieve goals and build sound institutions | .929 | |
| | SO3 | Innovation is a crucial factor for ensuring economic growth, competitiveness, and the wellbeing of society | .930 | |
| | SO4 | Innovation creates jobs and gives people opportunities to utilize their potential while being active economic and social players | .923 | |
| | SO5 | Innovation leads to the development of a talented workforce | .924 | |
| | EO6 | Innovation leads to the creation of new sources of wealth | .923 | |
| | EO7 | Innovation leads to financial optimization | .927 | |
| | EO8 | Innovation leads to service performance improvement | .927 | |
| | EO9 | Innovation leads to the discovery of the unmet needs of current and future generation | .925 | |
| | PSO10 | Innovation can be instrumental in enhancing products, services, and processes in the public sector | .923 | |
| | PSO11 | Innovation plays a significant role in encouraging and stimulating service improvement | .925 | |
| | PSO12 | Innovative and talented individuals are attracted to places where their talent is recognized, appreciated, and deployed | .928 | |

## 7.4. Descriptive Statistics

The approach on data manipulation involves a summary statistic that quantitatively describes the features of a collection of information. Expressive statistics targets to summarize the study sample rather than learning more of the overall population. Such aspect creates the distinction it has from inductive statistics that emphasis on the need for the researcher to review the study population. Unlike the inferential statistics, descriptive methods have less basis of its operations on the probability theory. The following descriptive statistics showing the demographic attributes of the questionnaire participates. Table 7.4 summarizing the data loading in the eight demographic variables used in the study.

Table 7.4: Demographic variables

| Demographic Variables | Org_Type | Org_Size | Job_Level | Experience | Education | Age | Gender | Nationality |
|---|---|---|---|---|---|---|---|---|
| Public | 50 (63.3%) | | | | | | | |
| Private | 9 (11.4%) | | | | | | | |
| Semi – Government | 18 (22.8%) | | | | | | | |
| Other | 2 (2.5%) | | | | | | | |
| 1 – 49 | | 6 (7.6%) | | | | | | |
| 50 – 999 | | 31 (39.2%) | | | | | | |
| 1,000 - 4,999 | | 29 (36.7%) | | | | | | |
| 5,000 or more | | 13 (16.5%) | | | | | | |
| Don't know | | 0 (0%) | | | | | | |
| Employee | | | 26 (32.9% | | | | | |
| Middle Management | | | 40 (50.6%) | | | | | |
| Top Management | | | 13 (16.5%) | | | | | |
| 0 – 2 | | | | 2 (2.5%) | | | | |
| 3 – 5 | | | | 12 (15.2%) | | | | |
| 6 – 10 | | | | 20 (25.3%) | | | | |
| 11- 19 | | | | 31 (39.2%) | | | | |
| 20 or above | | | | 14 (17.7%) | | | | |
| High school graduate or Less | | | | | 1 (1.3%) | | | |
| College degree | | | | | 2 (2.5%) | | | |
| Higher Diploma / Bachelor degree | | | | | 31 (39.2%) | | | |
| Masters | | | | | 39 (49.4%) | | | |
| Doctorate or above | | | | | 6 (7.6%) | | | |
| Less than 24 | | | | | | 1 (1.3%) | | |
| 25 – 30 | | | | | | 13 (16.5%) | | |
| 31 – 40 | | | | | | 44 (55.7%) | | |
| 41 – 50 | | | | | | 15 (19%) | | |
| 51 or above | | | | | | 6 (7.6%) | | |
| Male | | | | | | | 46 (58.2%) | |
| Female | | | | | | | 33 (41.8%) | |
| UAE National | | | | | | | | 49 (62%) |
| Non UAE National | | | | | | | | 30 (38%) |

The followings are the discussion of breakdown demographics information based on each used variable with an illustration of the results on the pie chart:

### 7.4.1. Type of your organization

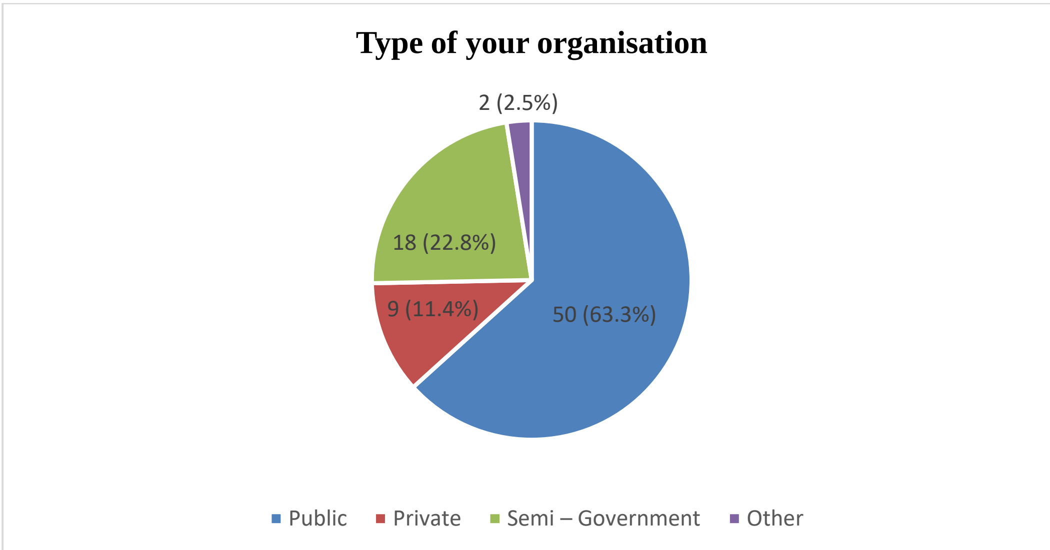



Figure 7.1: Research sample type of organization breakdown

Figure 7.1 shows the finding of the respondents' kind of organization. It is essential to establish this demographic variable, as the study is undertaken on the public sector. Therefore, the majority of the responses should come from participants representing public sector organization. As shown in the pie chart that almost 60% of the respondents are from the public sector, and this accounts for precisely 50 responses out of 79 collected sample. Whereas, the second came the semi-government sector with 18 replies and accounted for 22.8%. The remaining came from the private sector with nine responses (11.4%), and only two answers fall under the category of others which might represent non-for-profit organizations. As mentioned, such demographic variable is critical for ensuring that the data came from the right sources taking into account the standard practices in innovation and strategy management in both sectors; public and semi-government. This would improve the generalizability of this research findings as adding both areas together will account for 86% of the total sample size (68 responses). The categorization of sectors shown in figure 7.1, highlight that almost all data came from the right source and sample size giving the creditability to this research findings and implications.

### 7.4.2. Size of your organization (employees number)

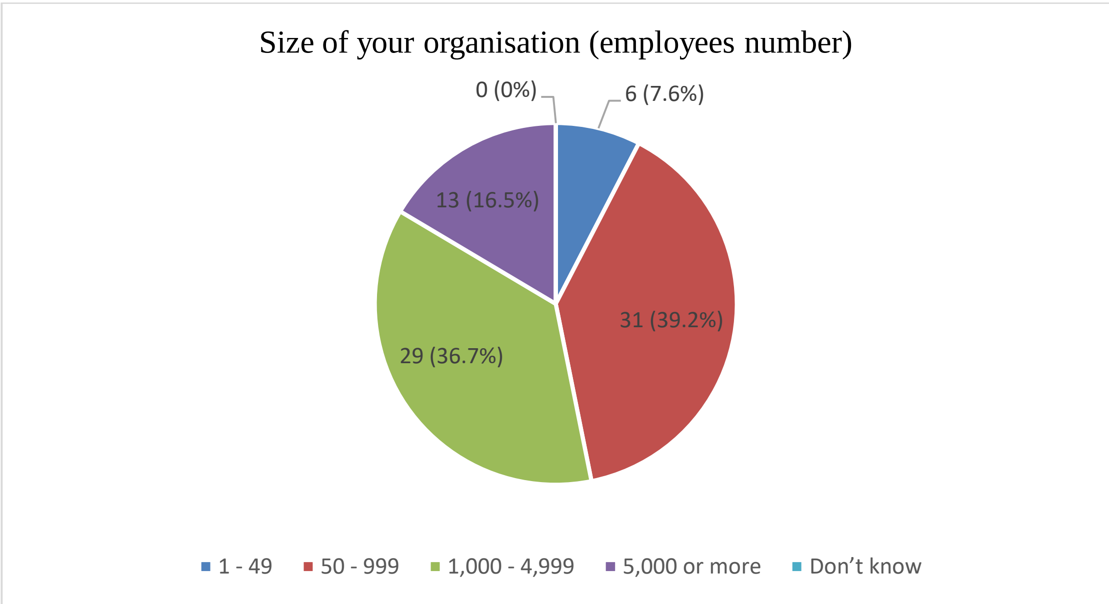



Figure 7.2: Research sample size of organization breakdown

Figure 7.2 shows the finding of respondents' organizations size regarding employees' number description as follows: 6 respondents (7.6%) belong to the minimal size of the organization as some employees' ranges from 1 to 49. Whereas, 31 respondents (39.2%) belongs to medium size organization with headcounts of 50-999, indicates the majority group in this study, along with almost similar figures of 29 respondents (36.7%) belong to large size organization. The statistics also designate that 13 respondents (16.5%) work for huge organizations.

### 7.4.3. No. of total years of work experience

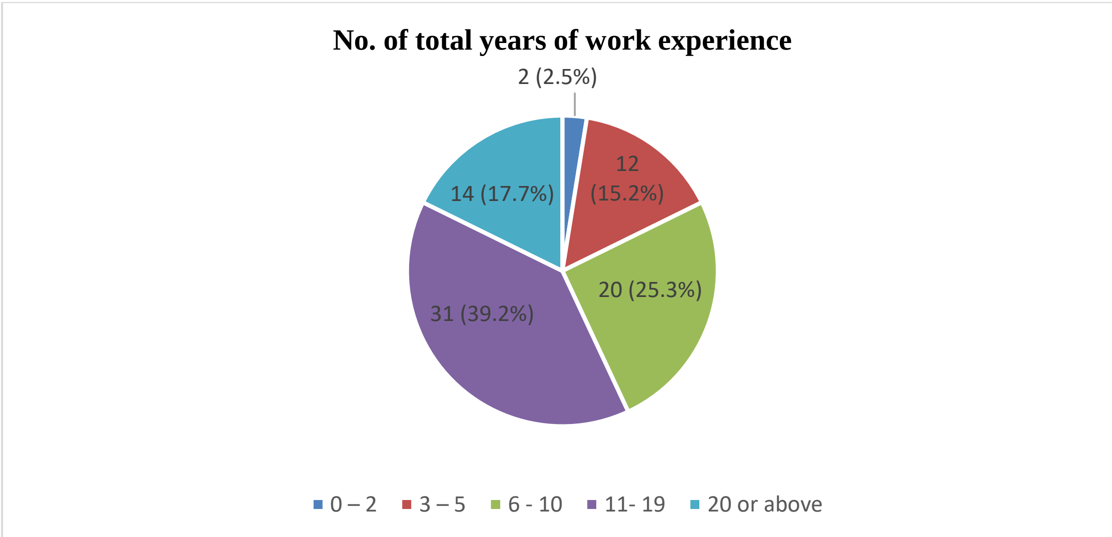



Figure 7.3: Research sample no. of total years of work experience breakdown

Figure 7.3 shows the finding of respondents' number of complete years of work experience description as follows: 2 respondents (2.5%) with 0-2 years of experience, 12 respondents (15.2%) with 3-5 years of experience, 20 respondents (25.3%) with 6-10 years of experience, 31 respondents (39.2%) with 11-19 years of experience, and finally 14 respondents (17.7%) with 20 or above years of experience. From the figures shown in the pie chart 7.3, it can be argued that the majority of the respondents had an extremely high level of expertise in the public sector. This finding should enrich the outcomes of this study as the level of experienced people participated in the questionnaire are profoundly advance in which almost 55% of them have 11 years and above as total experience. In addition to around 25% of respondents have from 6 to 10-year work experience, in a sense that by this amount of work experience they can be well-performed innovation strategy and participate in formulating and implementing innovative ideas.

### 7.4.4. Job level

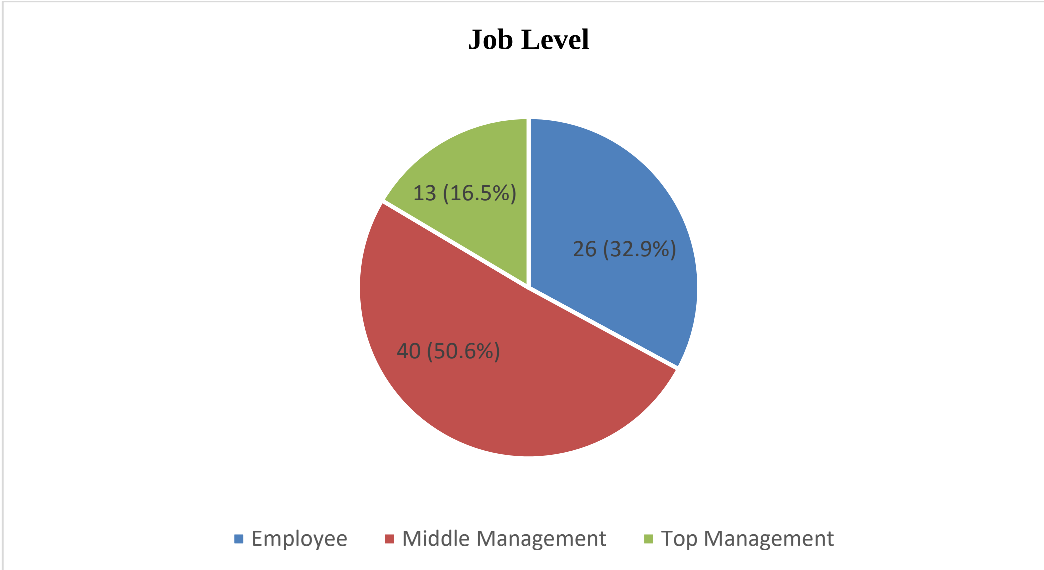



Figure 7.4: Research sample job level breakdown

Figure 7.4 shows the finding of respondents' job level described mainly in 3 certain levels as follows: employee level with the lowest number of respondents, only 13 employees (16.5%) participated in the questionnaire. The majority of respondents are in the middle management level with 40 responses (50.6%), and 26 respondents (32.9%) in the top management level. Interestingly, the participation in the survey study of this research paper was from high career level with a respected career profile taking into account the findings from the respondents' total years of work experience. This would support the research with rich inputs from the empirical study conducted on the public sector. This will also allow the investigation to stand on a strong base and confidently pursue the aim of the research to find out and confirm the correlations between conceptualized innovation variables.

### 7.4.5. Educational level

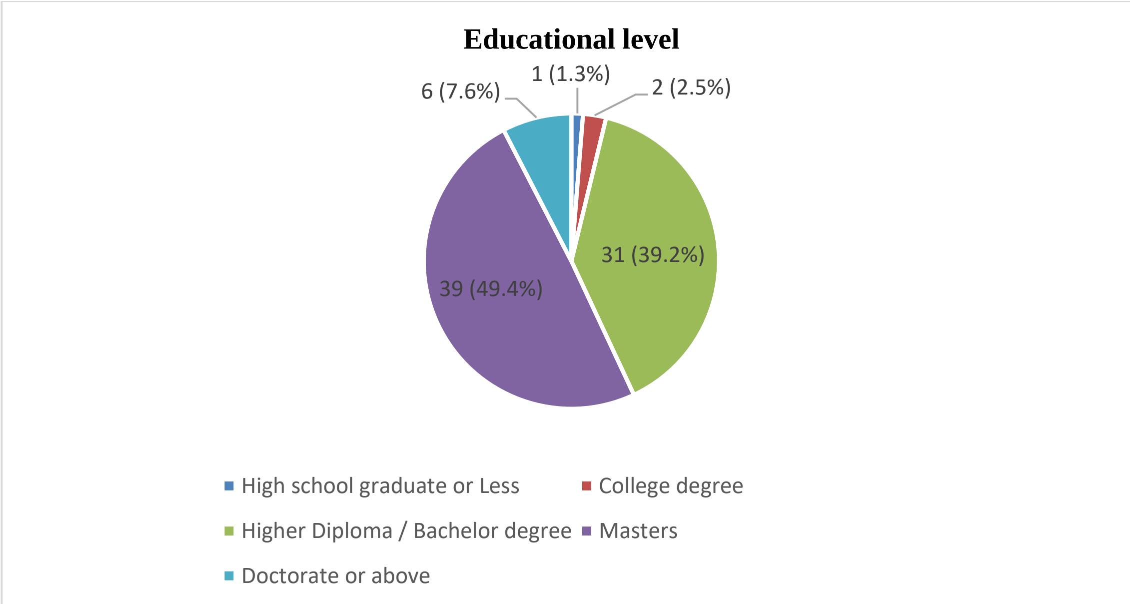



Figure 7.5: Research sample educational level breakdown

Figure 7.5 shows the finding of respondents' education level described according to academic degree as follows: 1 respondent (1.3%) with high school graduate or less, 2 respondents (2.5%) with college degree, 31 respondents (39.2%) with higher diploma or bachelor degree, 39 respondents (49.4%) with master degree, and 6 respondents (7.6%) respondents with doctorate or above. Remarkably, the findings indicate that the majority of the respondents are well educated academically in which almost 57% of the respondents hold master and doctorate. This gives excellent value for the collected sample as it represents participation of high profile people at the public sector.

### 7.4.6. Age

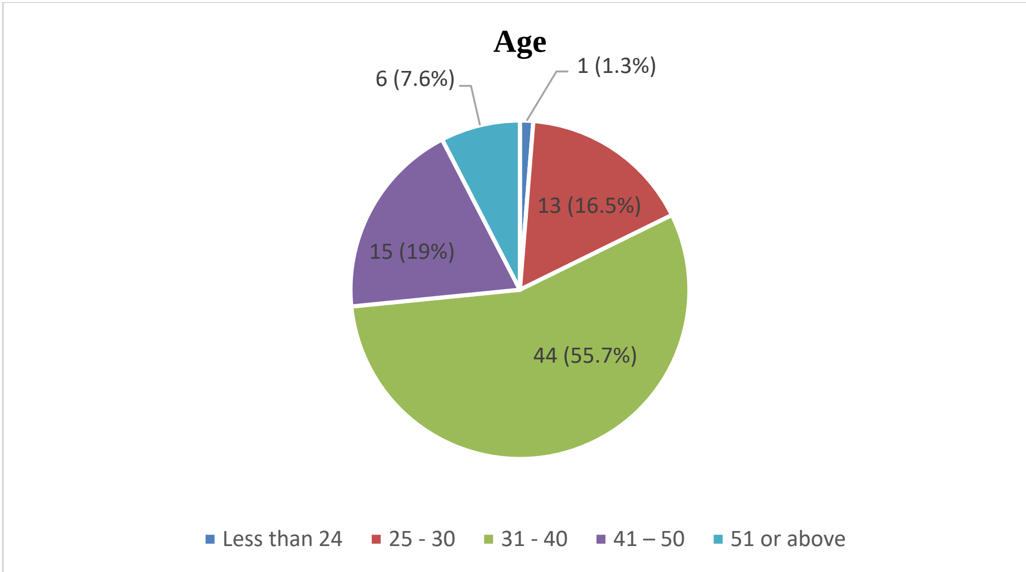



Figure 7.6: Research sample age breakdown

Figure 7.6 shows the finding of respondents' age description as follows: 1 respondent (1.3) with age less than 24, 13 respondents (16.5%) with age between 25 - 30, 44 respondents (55.7%) with age between 31 - 40, 15 respondents (19%) with age between 41 - 50, 6 respondents (7.6%) with age 51 or above. The majority of questionnaire participants are aged between 31 and 50 accounting for almost 70% of total respondents.

### 7.4.7. Gender

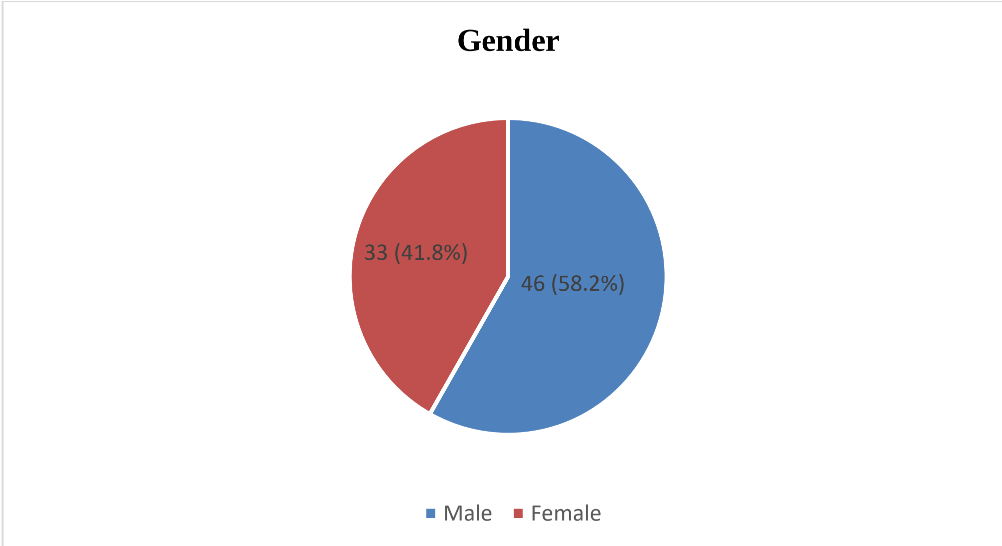



Figure 7.7: Research sample gender breakdown

Figure 7.7 shows the finding of respondents' genders description as follows: 46 (58.2%) respondents were male, and 33 respondents (41.8%) were female.

### 7.4.8. Nationality

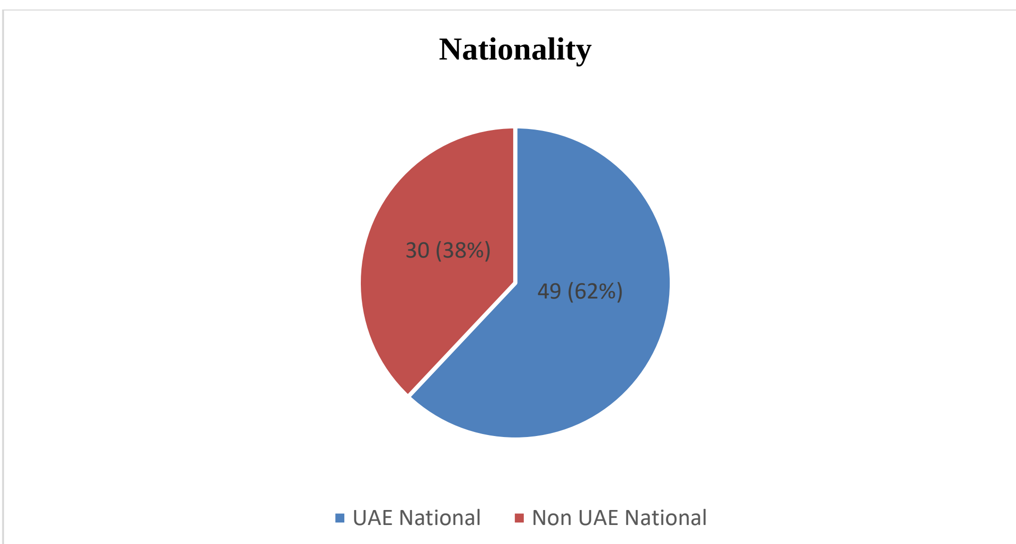



Figure 7.8: Research sample nationality breakdown

Figure 7.8 shows the finding of respondents' nationality description as follows: 49 (62%) respondents were UAE national, and 30 respondents (38%) were non-UAE national. It is noticed here a large number of the respondent are UAE nationals. This is due to the Emiratization policy applied across federal and local government entities in the UAE.

## 7.5. Descriptive Analysis of the Variables

The organization size, level of experience, nationality, job level, education, and gender adds up to a critical attribute of the descriptive analysis. The summary of statistics for every variable shows a mass sense of how a group of sampled population relates to the overall study. Thus each concept has a formal link to each other to keep the description relevant. The following are descriptive statistical analysis of all variables, however the detailed analysis of descriptive statistical of all variables at each item level is provided in Appendix 3.

## 7.6. Descriptive Analysis of Performance Level Measurements

The section highlights the significance of indicators under the performance measurement part of the distributed questionnaire. The illustration of attributes on each defined level helps the practitioner to acknowledge and measure outcomes on each affected portion rather than examining the performance on organizational level standalone. Therefore, top-ranked indicators in each performance level were identified and presented in the followings subsection based on their importance from the descriptive analysis.

### 7.6.1. Project level management

In the project level, the identified indicators highlight the influence of selected items over the performance of the project to deliver innovation outcomes. Table 7.6.1 presents the descriptive statistics of the project level which mainly shows 5 variables measuring the performance at this level. PLM1 has the highest ranked frequency with a mean score of (3.85), standard deviation at (1.063), and variation of (1.130). PLM1 states “People are encouraged to submit ideas in your organization”. On the other hand, the descriptive statistics indicate that PLM3 has the lowest ranked frequency with a mean score of (3.47), standard deviation at (1.239), and variation of (1.534). PLM3 states “We can use work time to work with others on project ideas”. Overall, it is clearly noticed that the range between the highest scored mean and the lowest scored mean is very small, thus this finding indicates that there is a high level of concordance among questionnaire participants on the importance of all selected factors to measure the performance of the project.

The results from the literature review indicates that the identified predictors of projects to enhance its performance and instill innovation within its process varies, some focusing on providing an encouraging environment to project team members to build on innovative ideas as similar to predictor “PLM1”, while others focus on the project management process such sharing the lessons learned and involve stakeholders very closely to understand their needs. Kaplan (2017) for example supports the same finding and suggests that the role of the organization’s leadership is important to promote a culture of innovation in projects. In this sense, the leader does not even need to set bind the project innovative idea, rather simply devise the team member with the right tool and healthy/creative work environment. This finding is in agreement with O'Byrne et al. (2014) finding which conceived leaders as a champions of change and encourage the innovation culture in the public sector, as they stated "we can innovate" culture and not "we do not have the means to innovate" (O’Byrne et al. 2014, p. 57). In fact, the focus of this factor needs to cover both aspects, input, and output to effectively help evaluate the results. The input side; ensures the availability of resources, investments, and behaviors, and the output focuses on the desired outcomes achieved out of innovation initiatives. Having said the measurement of critical factors on both aspects would help to gear the efforts toward the culture of innovation at the project level (Chen et al. 2016).

Similarly, PLM4 which states “We capture the lessons learned from our projects” is one of the factors that influences the project performance, as the results showed that the overall ranking is the 2nd. This indicates that the respondents perceived the lessons learned factor as a significant influence on the project performance. This can be interpreted as learning from previous lessons helps projects to overrun the obstacles and mitigate the risks at early stages. Therefore, the innovative idea behind delivering a specific project can be smoothly achieved if such a factor is taken into consideration at early stages of the project lifecycle. It is encouraging to compare this result with that found by Hartley (2006) who found that the cycle of innovation lies within the enterprise and offers the opportunity for organization learning about new and useful ideas, weaknesses and strengths of the agency in managing innovation. The present findings seem to be consistent with other researches such as Agarwal and Selen (2013) who stressed that for a public sector to become innovative it has to undergo learning from past experiences and also capturing the lessons learned from the processes, organizational arrangement, skills, and linkages. Therefore the organization needs to establish an innovation ecosystem to facilitate the effectiveness and sustenance of innovation at the project level.

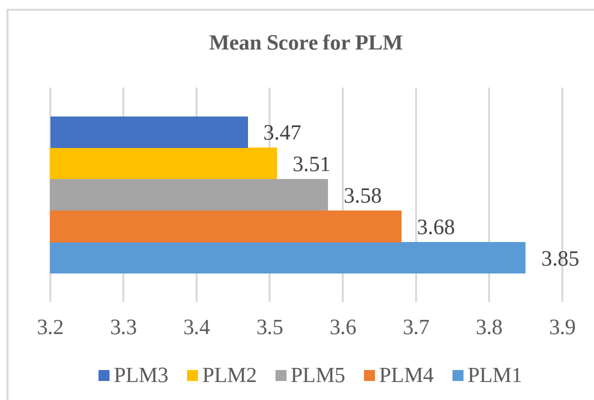
Other factors are considerably scored high as well, such as PLM5 “We involve our stakeholders very closely with our business so that we all fully understand their project needs” at mean equals to (3.58) and PLM2 “We generate and prototype new project ideas” at mean equals to (3.51). This means those factors along with PLM3 can also influence the performance of the project and helps facilitates the implementation of innovative ideas. These results match those observed in earlier studies by Industry Skills Councils (2009) who proposed a framework of six pillars to support the innovation diffusion process, which mainly affirms that individuals should have the right skills to represent the idea to evaluate its usefulness and applicability and have to collaborate with stakeholders to develop the idea and reflect on its viability.

As an implication at the project level, this combination of findings provides some support for the project managers and project team members to simply devise them with right skills and environment to help them turn their innovative ideas to viable projects. Another issue that emerges from these findings is the importance of generating and prototyping new project idea to evaluate its usefulness and applicability and to collaborate with relevant stakeholders to further develop the concept till turn it the to reality.

Table 7.6.1: Descriptive Statistics of PLM

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| PLM1 | 3.85 | 1.063 | 1.130 |
| PLM4 | 3.68 | 1.116 | 1.245 |
| PLM5 | 3.58 | 1.257 | 1.580 |
| PLM2 | 3.51 | 1.131 | 1.279 |
| PLM3 | 3.47 | 1.239 | 1.534 |




### 7.6.2. Program level management

In the program level, the identified indicators highlight the influence of selected items over the performance of the program to deliver innovation outcomes. Table 7.6.2 presents the descriptive statistics of the program level which mainly shows 5 variables measuring the performance at this level. PrLM3 has the highest ranked frequency with a mean score of (3.46), standard deviation at (1.107), and variation of (1.226). PrLM3 states “At the program level we are able to take “acceptable risks” when necessary”. On the other hand, the descriptive statistics indicate that PrLM4 has the lowest ranked frequency with a mean score of (3.28), standard deviation at (1.154), and variation of (1.332). PrLM4 states “Culture at the program level encourages risk-taking and collaboration efforts to implement new ideas”. It is clearly noticed that the range between the highest scored mean and the lowest scored mean is very small, thus this finding indicates that there is a high level of concordance among questionnaire participants on the importance of all selected factors to measure the performance of the program. These factors may explain the relatively good correlation between program level and its selected factors. For example, PrLM3 and PrLM4 measured whether the organization supports a culture of risk-taking to take the adventure of deploying new ideas. Basically, integrating new innovative idea in the public sector needs a clear risk assessment and strategies. This is mainly to broaden the scope of new idea’s impact in order to be more applicable to the wider society. However, in the public sector, facilitating the culture of risk-taking is usually faced with high resistance. This could be the main reason behind the inconsistency between the highest and the lowest ranking of the predictors. Alsos et al. (2015) agree with the view that public organizations take a conservative view in cases of a new process or product development. In accordance with the present results, Boyne and Walker (2004) have demonstrated that change defenders in organizations will later become adopters of new innovative strategies in the market.

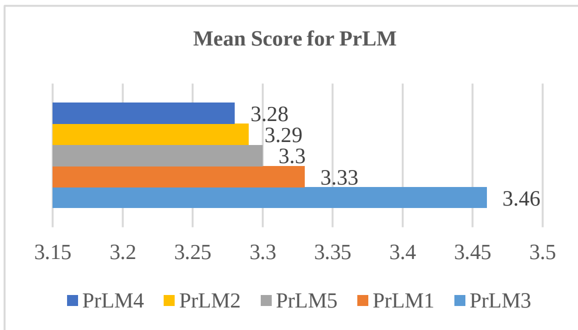
In fact, PrLM1 which states “Lessons learned from projects are shared among the program”, PrLM2 “Team members stay up-to-date of the most current knowledge within their field of work”, and PrLM5 “Information about successful ideas is shared between projects and between program team members” are almost highlighting the importance of learning and sharing the knowledge aspect among projects and programs. The present findings seem to be consistent with other research such as Birkinshaw et al. (2008) which found that building networks for information sharing and promoting best practices facilitate the adoption of innovation. Literature also underlined that the need for effective programs has recently increased. As a panacea to such demand, this followed by the collaborative efforts to mitigate the scarcity of resources and be more contingent to increase the reliance on the shared resources and access to information of governmental activities through innovative programs (Blackmon 2008).

As an implication at the program level, these findings suggest stimulation of the risk-taking approach among the organization culture and create a platform of lessons learned from projects to keep the team members stay up-to-date of the most current knowledge within their field of work.

Table 7.6.2: Descriptive Statistics of PrLM

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| PrLM3 | 3.46 | 1.107 | 1.226 |
| PrLM1 | 3.33 | 1.152 | 1.326 |
| PrLM5 | 3.30 | 1.159 | 1.342 |
| PrLM2 | 3.29 | 1.111 | 1.235 |
| PrLM4 | 3.28 | 1.154 | 1.332 |




### 7.6.3. Portfolio level management

In the portfolio level, the identified indicators highlight the influence of selected items over the performance of the portfolio to deliver innovation outcomes. Table 7.6.3 presents the descriptive statistics of portfolio level which mainly shows 6 variables measuring the performance at this level. PoLM4 has the highest ranked frequency with a mean score of (3.37), standard deviation at (1.100), and variation of (1.210). PoLM4 states “The suitability of the idea is checked against the indicators of success”. On the other hand, the descriptive statistics indicate that PoLM2 has the lowest ranked frequency with a mean score of (3.05), standard deviation at (1.218), and variation of (1.485). PoLM2 states "Employees participate in important decisions taking on new ideas". It is clearly noticed that the range between the highest scored mean and the lowest scored mean is very small, thus this finding indicates that there is a high level of concordance among questionnaire participants on the importance of all selected factors to measure the performance of the portfolio.

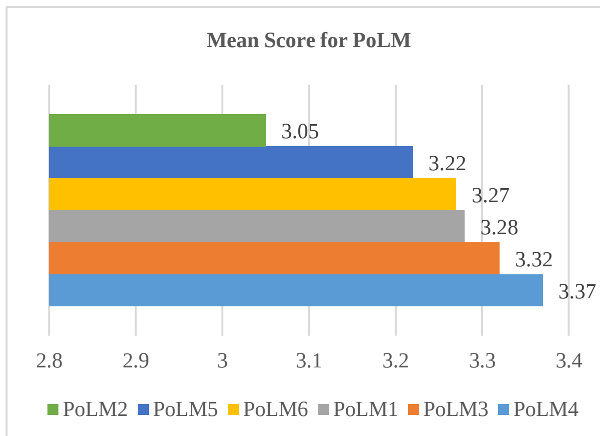
These factors may explain the relatively good correlation between portfolio level and its selected factors. For example PoLM4 and PoLM3 "Constructive and critical analysis is conducted to determine if full implementation of an idea is viable" measure whether the organization have in place a proper analysis process and evaluation criteria to specify the viability of the idea, such as deployment timeline, complexity, associated risks, and the desired outcomes, as some already mentioned in the PoLM1 "Ideas in portfolio are evaluated to ensure the balance of projects in terms of their timing, technical complexity, expected market impact and risk level" and PoLM5 "Indicators to assess innovation results are defined". The importance of those factors is inline and corresponding to the finding of the previous work in this field. For example, Jonas (2010) defined portfolio success by the criteria of average project success over all projects particularly according to triple constraints of; time, budget, scope, and customer satisfaction. Other researches such as Martinsuo and Lehtonen (2007); Meskendahl (2010) stressed on other similar criteria including portfolio's fit to the company's business strategy, and portfolio balance in terms of risk, the area of application, and use of technology. Basically, exploitation of synergies between projects within the portfolio potentially increasing the whole portfolio value, this relatively confirmed by PoLM6 which states "Information about successful ideas is shared among innovation project portfolio". Nevertheless, employees' participation in important decisions taking on new ideas becomes critical as stated in PoLM2. In this context, Walker (2014) stated that the organizational climate needs to be cohesive and supportive to employees to create the necessary stimulus for innovation.

As an implication at the portfolio level, these findings suggest to the practitioner to develop a constructive and critical analysis within the process of project selection to determine the suitability of presented ideas, ensure their viability, and check them against the indicators of success, in order to stimulate the innovation among all project portfolio.

Table 7.6.3: Descriptive Statistics of PoLM

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| PoLM4 | 3.37 | 1.100 | 1.210 |
| PoLM3 | 3.32 | 1.193 | 1.424 |
| PoLM1 | 3.28 | 1.120 | 1.255 |
| PoLM6 | 3.27 | 1.106 | 1.223 |
| PoLM5 | 3.22 | 1.082 | 1.171 |
| PoLM2 | 3.05 | 1.218 | 1.485 |




## 7.6.4. Strategy level management

In the strategy level, the identified indicators highlight the influence of selected items over the performance of organizational strategy to deliver innovation outcomes. Table 7.6.4 presents the descriptive statistics of the strategy level which mainly shows 12 variables measuring the performance at this level. SLM2 has the highest ranked frequency with a mean score of (3.59), standard deviation at (1.092), and variation of (1.193). SLM2 states "Strategies match well with the way the market is evolving". On the other hand, the descriptive statistics indicate that SLM11 has the lowest ranked frequency with a mean score of (3.01), standard deviation at (1.068), and variation of (1.141). SLM11 states "There is a strong diffusion network between the opinion-leader and the change agent influences innovation decisions”. It is clearly noticed that the range between the highest scored mean and the lowest scored mean is very small, thus this finding indicates that there is a high level of concordance among questionnaire participants on the importance of all selected factors to measure the performance of the organizational strategy.

These factors may explain the relatively good correlation between the strategy level and its selected factors. For example, SLM2 and SLM1 “Strategies are clear enough that we can translate it into innovation initiatives” measure whether the organization has in place a strategy to address their business needs. Therefore, the innovative strategy is designed in a way that translates the internal innovative initiatives into real practice taking into consideration the trends in the market industry. Here the public sector concerns are the impact on the communities addressing the social needs and economic development across the nation. These findings further support the idea of Meskendahl (2010) suggested that organizational performance is the logical outcome of a fit between strategy, structure, technology, and environment, so business success can be measured against the number of projects reflecting the business strategy.

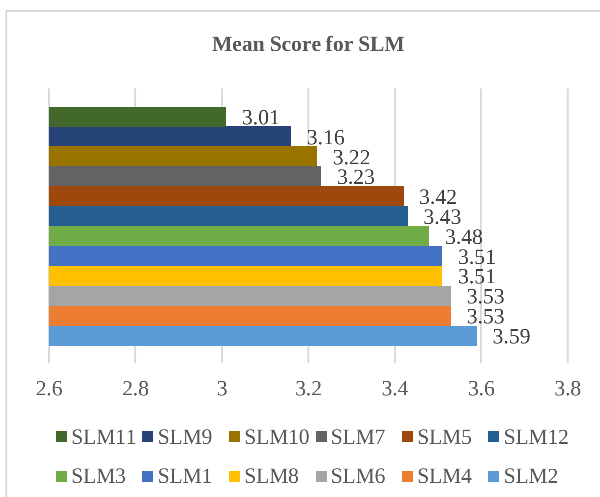
Top management support is however identified as an overarching success factor to any innovative strategy. According to (Amabile 1996), creating a culture of innovation within an individual, a group or an organization is key to the promotion of innovation. This finding confirms the association between top management support and innovation in business strategy as stated in SLM4 “Top management foster a culture that supports innovation” and SLM6 “Top management ensure that roles and responsibilities are properly assigned and communicated”. These results agree with the findings of Green et al. (2014) as he suggests that public organization would need strong leadership to facilitate strategy change and take vital decision making to transform the organizations into an innovative hub. The same importance is given to the existence of the approached to bring innovative ideas forward and to be aligned to strategy before implementation as stated in SLM8 “Team members are free to bring ideas forward, regardless of their formal position” and SLM3 “Approaches exist to ensure ideas are aligned to strategy before implementation”. This finding is in agreement with Kornfeld and Kara (2011) as they researched to link strategy to process improvement, and found out that portfolio generation could be effectively linked to strategic priorities and future states.

As an implication at the strategy level, this combination of findings provides some support for the practitioner to put in place a clear strategy that matches well with industry evolvements and can be translated into innovation initiatives. Besides, create a well-structured methodology to ensure innovative ideas are aligned to strategy before implementation and emphasis on the role of top management and their responsibilities to foster a culture that supports innovation

Table 7.6.4: Descriptive Statistics of SLM

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| SLM2 | 3.59 | 1.092 | 1.193 |
| SLM4 | 3.53 | 1.279 | 1.637 |
| SLM6 | 3.53 | 1.153 | 1.329 |
| SLM8 | 3.51 | 1.108 | 1.228 |
| SLM1 | 3.51 | 1.131 | 1.279 |
| SLM3 | 3.48 | 1.036 | 1.073 |
| SLM12 | 3.43 | 1.129 | 1.274 |
| SLM5 | 3.42 | 1.317 | 1.734 |
| SLM7 | 3.23 | 1.120 | 1.255 |
| SLM10 | 3.22 | 1.184 | 1.402 |
| SLM9 | 3.16 | 1.103 | 1.216 |
| SLM11 | 3.01 | 1.068 | 1.141 |




### 7.6.5. Government council level management

In the government council level, the identified indicators highlight the influence of selected items over the performance of government councils to deliver innovation outcomes. Table 7.6.5

presents the descriptive statistics of government council level which mainly shows 5 variables measuring the performance at this level. GCLM4 has the highest ranked frequency with a mean score of (3.75), standard deviation at (1.056), and variation of (1.115). GCLM states "Our innovation project has successfully addressed an important problem of public concern in the government sector". On the other hand, the descriptive statistics indicate that GCLM3 has the lowest ranked frequency with a mean score of (3.48), standard deviation at (1.084), and variation of (1.176). GCLM3 states "Diffusion of innovation strategy has added value, saved costs and generated new revenues across the government departments". It is clearly noticed that the range between the highest scored mean and the lowest scored mean is very small, thus this finding indicates that there is a high level of concordance among questionnaire participants on the importance of all selected factors to measure the performance of government council innovation strategy and projects.

The government council role in the innovation framework is to set the pillars of focused schemes and industries and defined the nation visions that to be aligned with all innovation initiatives and strategies across the government entities. According to Joseph and Lill (2013), the government provides the policy framework that facilitates the operation of the entities. It determines the demand side policies which affect innovation like smart regulations, consumer education, taxation, pricing standards, and public procurement (Joseph & Lill 2013). GCLM1 states "Our innovation project has successfully addressed an important problem of public concern in the government sector" in which attempts to define the role of government in innovation strategy. As the mean ranked high there is agreement among survey participants that such a factor has an influence on the diffusion of innovation strategy at government council level. This is supported by the finding of other similar research conducted by Leydesdorff (2012) suggesting that the government along with the universities play a prominent role in creating innovative strategies in a knowledge-based society comprising of industries and the government. As similarly stated in the highest-ranked mean of GCLM4 that “Projects and programs are related to the objectives and goals of the government strategy and achieve economic value on the national level”. Apart from executing their main roles, government and other relevant players can also play the role of each other in designing an innovative economy (Razak et al. 2016). More support to this finding can be observed by GCLM3 which states “Diffusion of innovation strategy has added value, saved costs and generated new revenues across the government departments”.

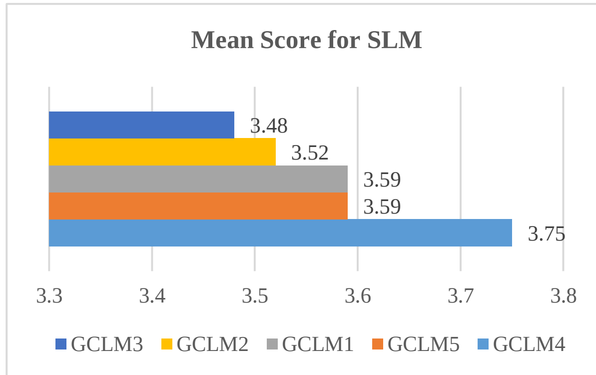
In addition, as mentioned in the literature review, Triple Helix model designed by Leydesdorff (2012), simplified the various degrees of a partnership between the government, the industry, and the universities as key players in public sector innovation. The result of designed model match those observed in GCLM5 which states “Information about successful ideas is shared with other governments” and GCLM2 states “Our innovation project, or aspects of it, has shown promise of being spread or replicated by other government entities. In fact, the collaborative relationship of the innovation players at government level aims at creating innovative policies results from their interactions. In this case, the government reduces risks associated with partnership building to create a robust scientific base (Razak et al. 2016).

This finding has important implications for diffusion innovation strategy on the federal and local government level. Some of the issues emerging from this finding relate specifically to the government role and the strategic partnership with academia arms to provide the innovation policy framework that facilitates the operation of the entities innovative. In addition to deploying innovative mechanism to successfully address an important problem of public concern in the government sector in a sense to be reflected in projects and programs that are related to the objectives and goals of the government strategy and achieve social and economic value.

Table 7.6.5: Descriptive Statistics of GCLM

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| GCLM4 | 3.75 | 1.056 | 1.115 |
| GCLM5 | 3.59 | 1.127 | 1.270 |
| GCLM1 | 3.59 | 1.104 | 1.218 |
| GCLM2 | 3.52 | 1.011 | 1.022 |
| GCLM3 | 3.48 | 1.084 | 1.176 |




## 7.7. Descriptive Analysis of Innovation Skills

This section presents an in-depth analyses of the vital indicators which mainly represent abilities under the innovation skills part of the distributed questionnaire. The illustration of skills on each defined stage helps the practitioner to explore and understand the competence required at each stage of the innovation process to diffuse innovation strategy in the public sector. Therefore, top-ranked indicators at each novelty stage were identified and explored in the followings subsection based on their importance from the descriptive analysis.

### 7.7.1. Knowledge stage skills

At knowledge stage, the identified indicators present the innovation skills at the innovation knowledge stage cycle. Table 7.7.1 presents the descriptive statistics of knowledge stage skills which mainly shows 15 variables measuring the importance of skills at this stage. KSS2 has the highest ranked frequency with a mean score of (4.52), standard deviation at (.638), and variation of (.407). KSS2 states “Idea formation skill helps individuals to generate innovative ideas”. On the other hand, the descriptive statistics indicate that KSS3 has the lowest ranked frequency with a mean score of (3.78), standard deviation at (.970), and variation of (.940). KSS3 states "Evaluating ideas is based on a predetermined cost-benefit analysis". It is clearly noticed that the range of mean score is very small among all indicators and they are above the score of (4), except for KSS3 which is the only indicator have a mean score below 4. Overall, this finding indicates that there is a high level of concordance among questionnaire participants on the importance of selected skills at the knowledge stage to diffuse innovation strategy in the public sector.

At knowledge stage, Rogers (2003) stated that an individual discovers the actuality of an innovation and thus tries to find further information about it. This implies high demand on the creativity and idea formation skills to help the individual learn about the innovation at early stages and seek more information and knowledge. As the highest scored mean for this stage is the skills related to creativity and idea formation, thus this finding is extremely supported by the literature in relation to KSS2 and KSS1 which states "Creativity can be fostered by removing barriers to knowledge-sharing". Braak (2001) found out if an individual has sufficient knowledge about how an innovation works, they will be more inclined to adopt that innovation. Key among this is the ability to scan the environment for such ideas.

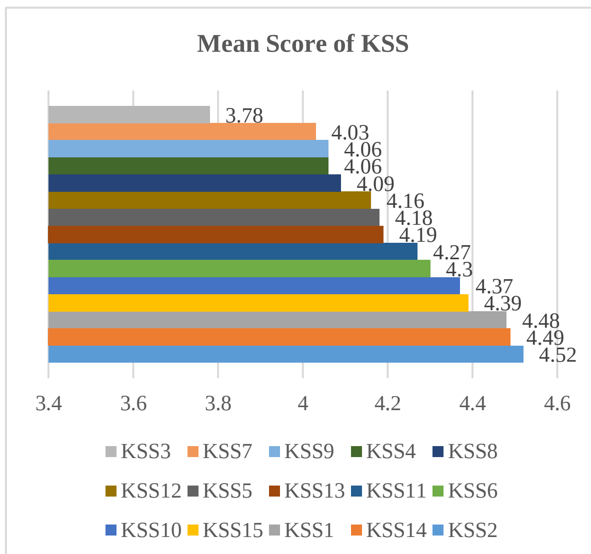
In public sector, an individual need to supporting skills in order to motivate other employees to be creative and bring forth their new ideas as stated in some high scored means such as KSS14 "Communication improves knowledge sharing and diffusion", KSS15 "Continuous improvement facilitates knowledge improvement" and KSS10 "Openness to new approaches expands opportunities". Graham-Leviss (2016) support the same findings by confirming that innovative employees always have an underlying desire for identifying new ideas or devising ways to resolve existing challenges. Thus, having a keen eye for activities or processes that can generate value for the individual, group or organization is key at this stage as information can only be sought about an already identified idea.

Some of the issues emerging from this finding relate specifically to required skills at very early stages of innovation diffusion which mainly in individual or a group start to learn more about the innovative idea. In addition, findings suggest further facilitation of knowledge sharing culture and openness to new approaches expands opportunities to leverage on the creativity and innovation, and those mainly associate with communication and continuous improvement skills.

Table 7.7.1: Descriptive Statistics of KSS

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| KSS2 | 4.52 | .638 | .407 |
| KSS14 | 4.49 | .618 | .381 |
| KSS1 | 4.48 | .695 | .484 |
| KSS15 | 4.39 | .629 | .395 |
| KSS10 | 4.37 | .624 | .389 |
| KSS6 | 4.30 | .774 | .599 |
| KSS11 | 4.27 | .746 | .557 |
| KSS13 | 4.19 | .802 | .643 |
| KSS5 | 4.18 | .874 | .763 |
| KSS12 | 4.16 | .758 | .575 |
| KSS8 | 4.09 | .804 | .646 |
| KSS4 | 4.06 | .965 | .932 |
| KSS9 | 4.06 | .822 | .675 |
| KSS7 | 4.03 | .751 | .563 |
| KSS3 | 3.78 | .970 | .940 |




## 7.7.2. Persuasion stage skills

At the persuasion stage, the identified indicators present the innovation skills at the innovation knowledge stage cycle. Table 7.7.2 presents the descriptive statistics of persuasion stage skills which mainly shows 13 variables measuring the importance of skills at this stage. PSS7 has the highest ranked frequency with a mean score of (4.35), standard deviation at (.801), and variation of (.642). PSS7 states “Communication skills improve the efficacy of the information-search process”. On the other hand, the descriptive statistics indicate that PSS6 has the lowest ranked frequency with a mean score of (4.04), standard deviation at (.808), and variation of (.652). PSS6 states “Problem-solving skills enable the individual to persevere in searching for innovative ideas”. It is clearly noticed that the range between the highest scored mean and the lowest scored mean is very small (all predictors’ mean scored above 4), thus this finding indicates that there is a high level of concordance among questionnaire participants on the importance of selected skills at the persuasion stage to diffuse innovation strategy in the public sector.

At this point the individual has developed ample interest on the innovative idea, and is now persuaded to develop a negative or positive attitude towards the idea; to either lead to its adoption or rejection, therefore, seeks out more information about it to inform their decision (Rogers 2003). According to him, communication and relationship skills are critical at this stage. This is due to the social reinforcement from family members, work colleagues and peers affect one’s opinions, coupled with the uncertainty about the functioning of the innovation. This notion supported by the findings of highest ranked predictors such as PSS7 which states “Communication skills improve the efficacy of the information-search process”, PSS1 states “The presence of relationship skills facilitates the individual to search for feedback from multiple stakeholders”, and PSS10 “Sociability creates a more welcoming environment for individuals with information to share”. These findings further support the idea of Schoeman et al. (2012), as they noted that those skills reflect on the importance of collaboration, communication and Relationship skills that are considered a key to diffuse innovation. In fact, individual needs to learn the attribute of building and maintaining relationships both within and out of their circles since such relationships provide insights on experiences with similar and different innovations and can be used as a basis for one’s decision to either adopt or reject an innovation.

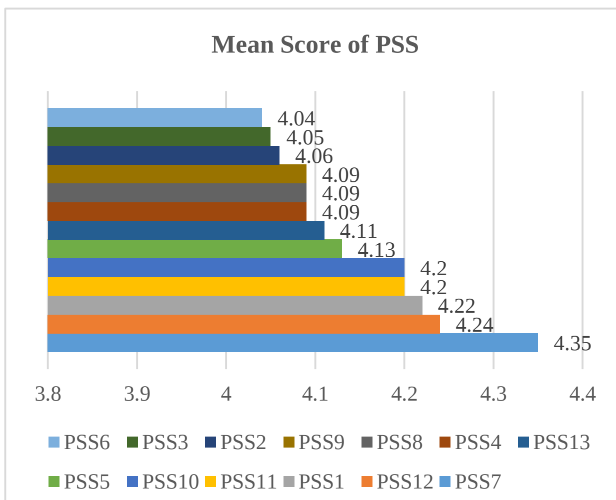
As the outcomes of this stage is an individual's buy-in on the innovation, analytical skills are important at this stage. Looking at PSS12 which states "Lateral thinking makes the individual more resourceful with the available information" and PSS11 "Problem visualization can empower individuals to pursue on innovative ideas", those predictors presents the importance of analytical thinking skills to pursue on the innovation. Therefore, this finding is in agreement with Horth and Buchner (2015) findings which shows the importance of innovation champion to be able to encourage productive dialogue among the decision maker to determine what is to be considered important and what has to be disregarded.

This combination of findings provides some support for the innovation champions to be knowledgeable and well skilled to take the proposed innovation forward and seek buy-in from the experiences of peers, family members or friends, and the decision makers. The presence of relationship and analytical thinking skills are the key at this stage to help an individual think beyond the obstacles and be more resourceful with the information that facilitates the search for feedback from multiple stakeholders.

Table 7.7.2: Descriptive Statistics of PSS

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| PSS7 | 4.35 | .801 | .642 |
| PSS12 | 4.24 | .683 | .467 |
| PSS1 | 4.22 | .728 | .530 |
| PSS11 | 4.20 | .668 | .446 |
| PSS10 | 4.20 | .723 | .523 |
| PSS5 | 4.13 | .790 | .625 |
| PSS13 | 4.11 | .784 | .615 |
| PSS4 | 4.09 | .788 | .620 |
| PSS8 | 4.09 | .894 | .800 |
| PSS9 | 4.09 | 1.028 | 1.056 |
| PSS2 | 4.06 | .837 | .701 |
| PSS3 | 4.05 | .766 | .587 |
| PSS6 | 4.04 | .808 | .652 |



### 7.7.3. Decision stage skills

At decision stage, the identified indicators present the innovation skills at the innovation-decision stage cycle. Table 7.7.3 presents the descriptive statistics of decision stage skills which mainly shows 13 variables measuring the importance of skills at this stage. DSS7 has the highest ranked frequency with a mean score of (4.35), standard deviation at (.848), and variation of (.719). DSS7 states “Decision-making power facilitates the adoption of new ideas”. On the other hand, the descriptive statistics indicate that DSS12 has the lowest ranked frequency with a mean score of (4.01), standard deviation at (.809), and variation of (.654). DSS12 states “Understanding and manipulating information sets facilitates more accurate forecasting for the performance of the innovation”. It is clearly noticed that the range between the highest scored mean and the lowest scored mean is very small (all predictors’ mean scored above 4), thus this finding indicates that there is a high level of concordance among questionnaire participants on the importance of selected skills at the decision stage to diffuse innovation strategy in the public sector.

In this stage, the choice to either adopt or reject the identified innovation is made. The most viable and easily adopted innovations are those with a trial basis as an individual is able to try it out before actually adopting it for the intended purpose (Roger 2003). This puts a high demand on the type and the power of the personal decision. As stated in highest-ranked mean by DSS7 “Decision-making power facilitates the adoption of new ideas” and DSS3 “Being proactive in the innovation idea catalyzes the decision-making process”. Therefore, decision making power and being proactive catalyzes the process of moving the innovative idea forward to adaption phase (O’Byrne et al. 2014; Kim 2011). The skills required at this stage mostly involve the evaluation of the identified ideas, as stated by DSS2 “Smart and diligent individuals spend more time on the evaluation of potential innovation”. This is supported by Wejnert (2002) as the chances of adoption of a given innovation are usually higher when the innovation has strong benefits over its alternatives, can be tried and the outcomes observed before actual adoption, is not too complex and therefore will be easy to implement. DSS11 is one of the highest ranked predictors at this stage and it states “Prototyping efficiently exposes the real-world efficacy of the decision by testing it accordingly”. The finding supports the notion that prototyping the idea facilitates more accurate forecasting for the performance of the innovation and provide adequate simulation to make informed decisions.

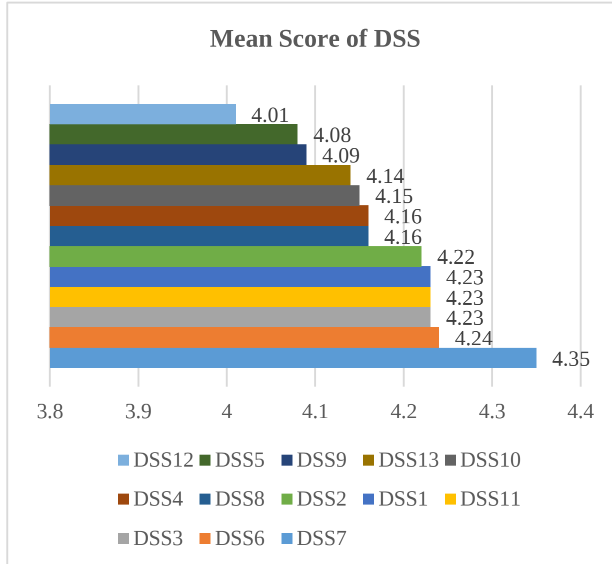
In fact, at decision stage, the risk assessment is key since every new idea has associated risks that should be identified at the inception and strategies to mitigate them established. The finding shows the high rank of risk predictor as stated in DSS6 “Communication of risk enrich the decision on adopting new ideas” and DSS1 which states “Understanding the risks associated with innovative idea increases the chance of adopting the idea”. This is in agreement with Autor (2015) that there is a need to examine and assess the risks of new opportunities when they arise and be flexible enough to enable quickly change directions in order to exploit the new opportunities and mitigate its challenges.

The issues emerging from this finding relate specifically to the approach to be taken by the innovation champion in order to stimulate the decision-making process. It is important to be proactive and spend more time on the evaluation of potential innovation by understanding the risks associated with an innovative idea and testing it accordingly through simulation and prototyping to increase the chance of adopting the idea.

Table 7.7.3: Descriptive Statistics of DSS

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| DSS7 | 4.35 | .848 | .719 |
| DSS6 | 4.24 | .851 | .723 |
| DSS3 | 4.23 | .697 | .486 |
| DSS11 | 4.23 | .619 | .383 |
| DSS1 | 4.23 | .933 | .870 |
| DSS2 | 4.22 | .762 | .581 |
| DSS8 | 4.16 | .775 | .601 |
| DSS4 | 4.16 | .940 | .883 |
| DSS10 | 4.15 | .769 | .592 |
| DSS13 | 4.14 | .693 | .480 |
| DSS9 | 4.09 | .737 | .543 |
| DSS5 | 4.08 | .888 | .789 |
| DSS12 | 4.01 | .809 | .654 |




### 7.7.4. Implementation stage skills

At the implementation stage, the identified indicators present the innovation skills at the innovation implementation stage cycle. Table 7.7.4 presents the descriptive statistics of implementation stage skills which mainly shows 15 variables measuring the importance of skills at this stage. ISS1 has the highest ranked frequency with a mean score of (4.46), standard deviation at (.656), and variation of (.431). ISS1 states "Implementation skill helps adapt the right tools and technologies to complete a task, project, or assignment". On the other hand, the descriptive statistics indicate that ISS14 has the lowest ranked frequency with a mean score of (3.85), standard deviation at (1.001), and variation of (1.002). ISS14 states "Managerial skills determine the efficacy of teamwork in innovation implementation". It is clearly noticed that the range of mean score is very small among all indicators and they are above the score of (4), except for ISS5 and ISS14 which are the only indicators have a mean score below 4. Overall, this finding indicates that there is a high level of concordance among questionnaire participants on the importance of selected skills at the implementation stage to diffuse innovation strategy in the public sector.

This is the stage where the chosen innovation is initially executed. Since the ideas have been identified at the knowledge and persuasion stages, there is a need for these to be converted into tangible variants to support the operations of the organization. Therefore, the skills relating to implementation, project management and problem-solving become highly needed at this stage. As mentioned, the highest ranked mean scored by ISS1 which states “Implementation skill helps adapt the right tools and technologies to complete a task, project, or assignment” also ISS11 predicts similar skills and it states “Creative abilities have a positive impact on innovation quality”, while in terms of problem-solving ISS9 states “Problem-solving skills assist in eliminating obstacles for innovation implementation”. According to Autor (2015), it is imperative that the individual identifies how to manage the scope, time and budgets allocated to the implementation in order to foresee any challenges that might be faced.

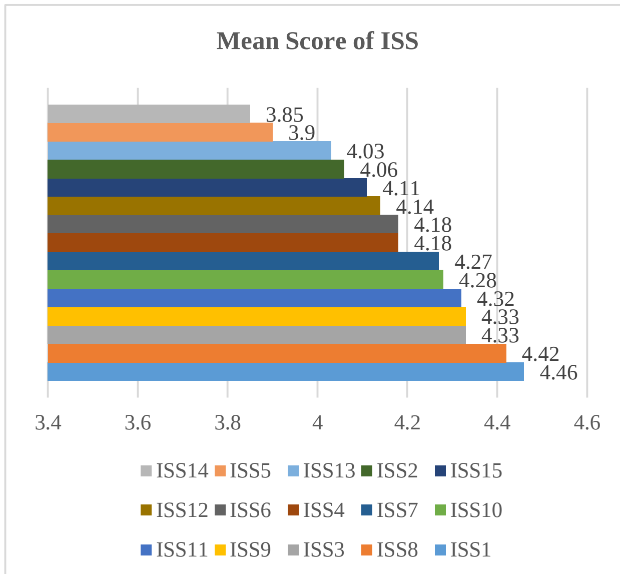
Relationship and teamwork skills are very key as an innovator needs to practice the execution attribute of the potential innovative and building up the idea on the ground. In line with this suggestion by Horth and Buchner (2015); De Vries et al. (2015); Gieske et al. (2016), the finding reflected in high rank of ISS3 which states “Relationship-building skill encourages knowledge-sharing during implementation of the innovative idea” and ISS10 “Ability to communicate issues generates opportunities in the implementation from multiple perspectives”, while in terms of teamwork ISS8 “Teamwork provides the opportunity to successful implementation of new ideas”. It is clear that teamwork and relationships provide insights on experiences from multiple perspectives to transcend challenges.

This combination of findings provides some support for the innovation champions and public sector leaders as well. Innovation champions can foster the implantation stage by demonstrating various problem-solving techniques and creative abilities to improve cohesion between the team and transcend challenges using the power of effective relationship-building and networking with vital influencers that are involved in the development stage of innovation. On the other hand, the leaders should be able to support his team to deliver and empower them to be able to make decisions regarding the progress of the implementation in the innovation concept. It is important to have a support from leadership to be accountable for the results that are arrived at, as a result of the implementation.

Table 7.7.4: Descriptive Statistics of ISS

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| ISS1 | 4.46 | .656 | .431 |
| ISS8 | 4.42 | .612 | .375 |
| ISS3 | 4.33 | .693 | .480 |
| ISS9 | 4.33 | .746 | .557 |
| ISS11 | 4.32 | .611 | .373 |
| ISS10 | 4.28 | .678 | .460 |
| ISS7 | 4.27 | .614 | .377 |
| ISS4 | 4.18 | .813 | .660 |
| ISS6 | 4.18 | .797 | .635 |
| ISS12 | 4.14 | .780 | .609 |
| ISS15 | 4.11 | .832 | .692 |
| ISS2 | 4.06 | .938 | .881 |
| ISS13 | 4.03 | .987 | .974 |
| ISS5 | 3.90 | .969 | .938 |
| ISS14 | 3.85 | 1.001 | 1.002 |




### 7.7.5. Scaling-up stage skills

At the scaling-up stage, the identified indicators present the innovation skills at the innovation scaling-up stage cycle. Table 7.7.5 presents the descriptive statistics of scaling-up stage skills which mainly shows 15 variables measuring the importance of skills at this stage. SSS15 has the highest ranked frequency with a mean score of (4.33), standard deviation at (.693), and variation of (.480). SSS15 states “Accepting feedback and learning from experience and mistakes leads to scaling-up innovative ideas successfully”. On the other hand, the descriptive statistics indicate that SSS4 has the lowest ranked frequency with a mean score of (3.77), standard deviation at (.876), and variation of (.768). SSS4 states "Emotional intelligence exposes the stakeholders' perception about the scaling-up of the adopted innovation". It is clearly noticed that the range of mean score is very small among all indicators and they are above the score of (4), except for SSS1, SSS2, SSS4 which are the only indicators have a mean score below 4. Overall, this finding indicates that there is a high level of concordance among questionnaire participants on the importance of selected skills at the scaling-up stage to diffuse innovation strategy in the public sector.

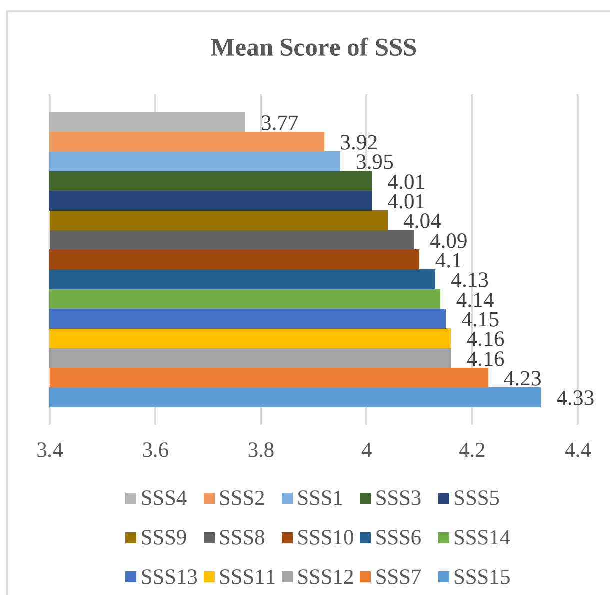
This stage allows the individual or group to seek support to make the adapted innovation larger than it used to be in size, amount, scope, or even widening the coverage area of innovation. Feedback messages, either supportive or against the innovation are both received, although at this point the idea mostly considers in support due to its partial or fully adaption. Recognizing opportunities for change or improvement needed to further scaling-up the initial innovation (Oetinger 2004). This is in agreement with finding of the two top-ranked predictors of this stage, the SSS15 which states "Accepting feedback and learning from experience and mistakes leads to scaling-up innovative ideas successfully" and SSS 7 "Sharing information and expertise inside the organization helps in the scaling-up process", in addition to the fifth-ranked predictor by SSS13 which states "Recognizing opportunities for change and improvement facilitates the scaling process". According to social psychologists, once an individual has made a difficult decision, the individual will find it psychologically satisfying to draw attention to the good reasons and away from the bad reasons for not scaling-up that innovation. Therefore, seeking continuous improvement through collaboration efforts become critical in order to gain the buy-in on the adapted innovation and to further improve the scaling process. The findings of SSS12 and SSS11 have direct indication on the collaboration efforts and with highly ranked predictors at this stage, SSS12 states "Collaborative efforts facilitate allocation of resources for networking and sharing ideas, knowledge, and skills to improve the scaling process" and SSS11 states "Collaboration makes it easy for the scaling-up process", while in terms of continuous improvement SSS14 states "The existence of the continuous improvement ethos facilitates the scaling process". Similarly, Wejnert (2002) defined that the earlier efforts made to achieve satisfactory results of adapted innovation help to anticipate new opportunities.

These findings may help to understand the importance of accepting feedback and learning from experience and mistakes. Thus, sharing information and expertise by innovation champions inside the organization helps to recognize new opportunities for change or improvement through collaborative efforts in order to scaling-up innovative ideas successfully. Nevertheless, management coordination is also key since they are responsible for the decision to scale-up innovation and ensuring its effective acceptance and application by the relevant stakeholders.

Table 7.7.5: Descriptive Statistics of SSS

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| SSS15 | 4.33 | .693 | .480 |
| SSS7 | 4.23 | .659 | .435 |
| SSS12 | 4.16 | .758 | .575 |
| SSS11 | 4.16 | .687 | .473 |
| SSS13 | 4.15 | .786 | .618 |
| SSS14 | 4.14 | .828 | .685 |
| SSS6 | 4.13 | .723 | .522 |
| SSS10 | 4.10 | .778 | .605 |
| SSS8 | 4.09 | .865 | .748 |
| SSS9 | 4.04 | .823 | .678 |
| SSS5 | 4.01 | .776 | .602 |
| SSS3 | 4.01 | .742 | .551 |
| SSS1 | 3.95 | .799 | .638 |
| SSS2 | 3.92 | .764 | .584 |
| SSS4 | 3.77 | .876 | .768 |



## 7.8. Descriptive Analysis of Innovation Outcomes

This section explores the features that impact indicators under the innovation outcomes as part of the distributed questionnaire. The illustration of indicators on each defined sector helps the practitioner to acknowledge and measure the attributes created due to diffusion of innovation strategy. Therefore, top-ranked indicators in each sector were identified and presented in the followings subsection based on their relevance to the descriptive analysis.

### 7.8.1. Social outcomes

In this part, the identified indicators present the innovation outcomes that have an impact on social aspects. Table 7.8.1 presents the descriptive statistics of social outcomes which mainly shows 5 variables measuring the importance of outcomes at this sector. SO1 has the highest ranked frequency with a mean score of (4.48), standard deviation at (.766), and variation of (.586). SO1 states "Happiness is an important societal quality, as it fosters nation's welfare, wealth accumulation, and invention". On the other hand, the descriptive statistics indicate that SO5 has the lowest ranked frequency with a mean score of (4.32), standard deviation at (.809), and variation of (.655). SO5 states "Innovation leads to the development of talented workforce". It is clearly noticed that the range of mean score is very small among all indicators and they are above the score of (4). Overall, this finding indicates that there is a high level of concordance among questionnaire participants on the importance of selected social outcomes in relation to diffuse innovation strategy in the public sector.

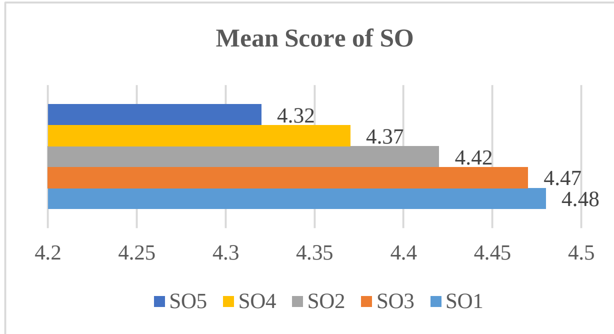
Nowadays, innovations are directed at solving problems within the human setting. Social environment describes the attributes of the demography served by the public organizations. Changes in social factors may force the public institutions exit or enter a certain market (Boyne & Walker 2004). As simpler solutions may give human happiness to society. This is a very relevant to exactly what has been reflected in the predictor ranking, as stated by SO1 “Happiness is an important societal quality, as it fosters nation’s welfare, wealth accumulation and invention”, and SO2 “Happy people are more optimistic, confident, and are willing to navigate untested environments to achieve goals and build sound institutions”. Happiness initiatives have no limits, even a small hack that reduce the time involved in doing duties create happiness. Innovation main intention is to make work easier for human beings (Daglio et al. 2014). Attainment of this, in any form, creates a social outcome of happiness. However, the impact can be highly recognized as stated in SO3 “Innovation is a crucial factor for ensuring economic growth, competitiveness, and the wellbeing of society”. According to O’Byrne et al. (2014) who studied social innovation in South Korea, they found that effective social innovation in this public sector was brought about by strong leadership, innovative culture, and collaborations to facilitate innovation. Innovation further plays a vital role in employee satisfaction. Thus, and according to Andrew et al. (2009); and Serrat (2012), at a social level innovation can improve social needs such as jobs creation and development of talented workforce, as stated in SO4 “Innovation creates jobs and gives people opportunities to utilize their potential, while being active economic and social players” and SO5 “Innovation leads to the development of a talented workforce”. In a broader perspective, a small or large scale social projects that are coming up with a new thing, there is also a sense of well-being that comes with a feeling of change that is brought with innovation project.

This finding has important implications for social outcomes due to diffusion innovation strategy on the federal and local government level. Some of the issues emerging from this finding relate specifically to happiness as an important societal quality because it fosters the nation’s welfare, wealth accumulation, and invention. In addition, innovation is a crucial factor for ensuring the well-being of society through multiple initiatives such as the development of the talented workforce, job creation and provide social members growing opportunities to utilize their potential, while being active economic and social players.

Table 7.8.1: Descriptive Statistics of SO

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| SO1 | 4.48 | .766 | .586 |
| SO3 | 4.47 | .713 | .509 |
| SO2 | 4.42 | .826 | .682 |
| SO4 | 4.37 | .803 | .646 |
| SO5 | 4.32 | .809 | .655 |




### 7.8.2. Economic outcomes

In this part, the identified indicators present the innovation outcomes that have an impact on economic aspects. Table 7.8.2 presents the descriptive statistics of economic outcomes which mainly shows 4 variables measuring the importance of outcomes at this sector. EO8 has the highest ranked frequency with a mean score of (4.46), standard deviation at (.694), and variation of (.482). EO8 states "Innovation leads to service performance improvement". On the other hand, the descriptive statistics indicate that EO7 has the lowest ranked frequency with a mean score of (4.16), standard deviation at (.839), and variation of (.703). EO7 states "Innovation leads to financial optimization". It is clearly noticed that the range of mean score is very small among all indicators and they are above the score of (4). Overall, this finding indicates that there is a high level of concordance among questionnaire participants on the importance of selected economic outcomes in relation to diffuse innovation strategy in the public sector.

Introduction of new ideas creates a reason to earn income at the organizational level which ultimately contributes to the national economy. Therefore, innovation enables the nation to stay at the top of the competition worldwide. Operationally, innovation contributes positively to cost reduction because of the use of new technology and more effective methods in the production process (Daglio et al. 2014). Obviously, this enhances key business operations and optimizes on the income generated at both federal and local governments. At business operation level, this is predicted with the highest ranked mean by EO8 which states “Innovation leads to service performance improvement”, while at financial aspect the finding presented in EO6 which states “Innovation leads to the creation of new sources of wealth”, and EO7 “Innovation leads to financial optimization”.

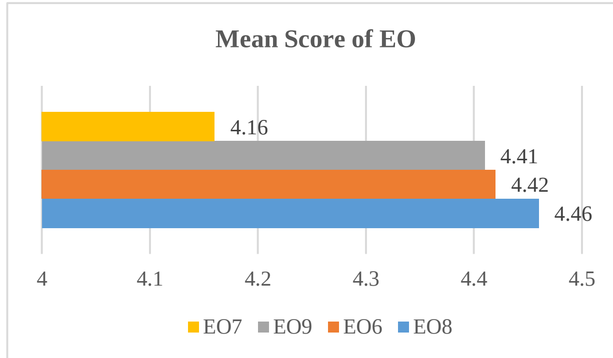
Innovation also covers the untouched areas or needs that had not yet been discovered. With technology in place, it creates the need that had not been initially anticipated. Hence, there will be a new market segment that is created and ventured as new business ideas. This innovation opportunity reflected in the predictor EO9 which states “Innovation leads to the discovery of the unmet needs of current and future generation”. This shows that innovation covers the needs of the consumer or improves on how the needs were met.

This finding has important implications for economic outcomes due to diffusion innovation strategy on the federal and local government level. Some of the issues emerging from this finding relate specifically to the operation optimization and wealth creation. The findings of economic outcome analysis show evidence that innovation can create new sources of income that would lead to financial optimization and enables the country to stay at the top of the competition worldwide. While, at the operation level, the analysis shows evidence that innovation can discover new opportunities throughout untouched areas making the use of up-to-date technology which in turn opens a new market segment and ventures.

Table 7.8.2: Descriptive Statistics of EO

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| EO8 | 4.46 | .694 | .482 |
| EO6 | 4.42 | .778 | .605 |
| EO9 | 4.41 | .855 | .731 |
| EO7 | 4.16 | .839 | .703 |




### 7.8.3. Public service outcomes

In this part, the identified indicators present the innovation outcomes that have an impact on public service aspects. Table 7.8.3 presents the descriptive statistics of public service outcomes which mainly shows 3 variables measuring the importance of outcomes at this part. PSO10 has the highest ranked frequency with a mean score of (4.48), standard deviation at (.714), and variation of (.509). PSO10 states “Innovation can be instrumental in enhancing products, services, and processes in the public sector”. On the other hand, the descriptive statistics indicate that PSO12 has the lowest ranked frequency with a mean score of (4.42), standard deviation at (.856), and variation of (.734). PSO12 states “Innovative and talented individuals are attracted to places where their talent is recognized, appreciated, and deployed”. It is clearly noticed that the range of mean score is very small among all indicators and they are above the score of (4). Overall, this finding indicates that there is a high level of concordance among questionnaire participants on the importance of selected public service outcomes in relation to diffuse innovation strategy in the public sector.

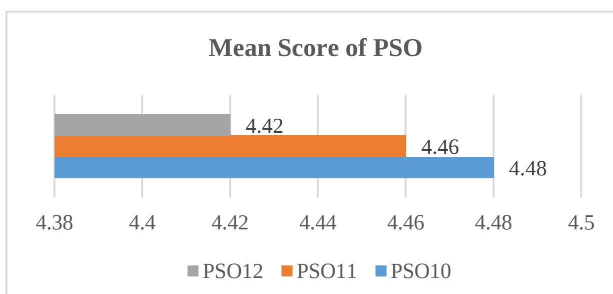
In general, public service has taken a massive step with their service delivery methods owing to new advancements. Across the public sector, innovation creates the platform for use of knowledge and technology to stimulate service delivery. This is reflected in the high rank of the finding of public service predictors such as PSO10 which states "Innovation can be instrumental in enhancing products, services, and processes in public sector", and PSO11 "Innovation plays a significant role in encouraging and stimulating service improvement". As a result of product enhancement and service improvements, highly talented individuals are recognized and retained with an attractive business environment (Daglio et al. 2014). PSO12 support this notion as it states "Innovative and talented individuals are attracted to places where their talent is recognized, appreciated, and deployed".

This finding has important implications for public service outcomes due to diffusion innovation strategy on the federal and local government level. Some of the issues emerging from this finding relate specifically to product enhancement and service improvements which attracts talented individuals to be recognized by the creative business environment. These findings provide evidence that talented individuals create innovation platforms to fosters public service delivery and inspiring work environment to achieve a high level of business excellence in public sector organizations.

Table 7.8.3: Descriptive Statistics of PSO

**Descriptive Statistics**

| | Mean | Std. Deviation | Variance |
|---|---|---|---|
| PSO10 | 4.48 | .714 | .509 |
| PSO11 | 4.46 | .712 | .508 |
| PSO12 | 4.42 | .856 | .734 |



## 7.9. Summary

The chapter provides details of the finding obtained from the research questionnaire. The section initially discussed in the introduction the way that the data will be explained and interpreted using the SPSS software.

In the respondents' general information part, the researcher highlighted that the target population of this study was around 400, and the sample size was 79 (fully completed questionnaire) which composes almost 20% of response rate. The sample was mainly collected from the UAE government sector, and the participants of this survey were people experienced or knowledgeable in innovation and strategic management in their organization.

The collected sample was then placed into SPSS to run a reliability analysis to ensure if the measurements assigned to each factor are consistent. The reliability test embraced used the method of Cronbach Alpha, which is the most popular method in statistics science. The rationale behind using Cronbach Alpha method is to weed out the poor questions and provide substantial evidence of its reliability to help the researcher develop a valid, coherent set of questions before analyzing the data and testing the hypotheses. The result of computing the Cronbach Alpha test showed that there are no further improvements can be undertaken to the enhance the questionnaire validity. This means all items passed the Cronbach Alpha test valued greater than .7. This helped the researcher confidently pursue with next stage of data analysis.

The descriptive statistics explained the demographic attributes of the questionnaire participates. The values indicate 63% of the participants were from the public sector; majority belong to medium and large organizations with 50 to 5000 workforce number. Interestingly, participants were well experienced with over 50% had more than 11 years of work experience in total, and they are from the middle and top management level. Also, they are highly educated as the majority holds master degrees.

In the Descriptive Analysis of the variables part, the data has been validated for its normality distribution by measuring the central tendency of the data set using the measure of mean, median, mode, standard deviation, and skewness. The values for all variables has shown that the standard deviation falls within the range of ±1 away from the mean, and the amount of skewness fall within the scope of ±1.96, which indicates normality of the data distribution.

# 8. CHAPTER EIGHT: FACTOR ANALYSIS

## 8.1. Introduction

The chapter has carefully presented the factor analysis for all developed variables of the study as depicted in the distributed questionnaire. The following analysis will show and explain the result of each performed test.

## 8.2. Factor Analysis Tests

For this study, a factor analysis will be performed to ensure the dimensionality and proper loading of instrument's items and to reduce the number of variables in a dataset. The distributed questionnaire consists of 3 main parts. Part one has 5 levels which are "Project Level Measurements (PLM)" with 5 subitems, "Program-Level Measurements (PrLM)" with 5 subitems, "Portfolio Level Measurements (PoLM)" with 6 subitems, "Strategy Level Measurements (SLM)" with 12 subitems, "Government Council Level Measurements (GCM)" with 5 sub items. Part two has 5 stages, and they are "Knowledge Stage Skills (KSS)" with 15 subitems, "Persuasion Stage Skills (PSS)" with 13 subitems, "Decision Stage Skills (DSS)" with 13 subitems, "Implementation Stage Skills (ISS)" with 15 subitems, "Scaling-up Stage Skills (SSS)" with 15 sub items. Part three has three clusters; they are "Social Outcomes (SO)" with 5 subitems, "Economic Outcomes (EO)" with 4 sub items and "Public Service (PSO)" with 3 sub items. The total number of items used in this questionnaire is 116, excluding the 8 questions under the demographic part. Factor analysis will be performed only for the variables with a big number of items, 12 and above. The selected variables are listed in table 8.2.

Factor loading can be classified according to their magnitude: greater than (+.3) is classified as a minimum consideration level, (+.4) is more important, and (+.5) is practically significant. Values of less than (0.3) or (0.4) are regarded as being trivial. Therefore, to attain a meaningful and interpretable structure of significant factors loading, a minimum value of 0.45 is set in SPSS as a cut-off point for accepting item's loading. Applying this criterion will improve the scale reliability and will help to exclude the poorly loaded items from further analysis.

In addition, table 8.2 presents the Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity along with Cronbach Alpha values for the intended variables that were selected to perform factor analysis. Kaiser-Meyer-Olkin Measure of Sampling Adequacy ensures the appropriateness of the factor analysis. The factor analysis would be appropriate if the Kaiser-Meyer-Olkin value of the variable ranged between 0.5 and 1. Variables with lower than those values would be inappropriate for the factor analysis technique. While Bartlett's test of Sphericity is a test statistic to indicate homogeneity of variances, meaning it explores if a sample is within an equal variance of the populations. Therefore, it can indicate uncorrelated variables in the population or can explore the proposed null hypothesis in the research. As mentioned earlier, Cronbach Alpha is a measure of scale reliability whereby measures the internal consistency of the variables measured.

Table 8.2: Tests for factor analysis applicability

| Variables | Kaiser-Meyer-Olkin (KMO) | Bartlett's Test | Cronbach Alpha | # of Items |
|---|---|---|---|---|
| Strategy Level Measurements (SLM) | .879 | .000 | .926 | 12 |
| Knowledge Stage Skills (KSS) | .728 | .000 | .854 | 15 |
| Persuasion Stage Skills (PSS) | .864 | .000 | .876 | 13 |
| Decision Stage Skills (DSS) | .769 | .000 | .854 | 13 |
| Implementation Stage Skills (ISS) | .738 | .000 | .874 | 15 |
| Scaling-up Stage Skills (SSS) | .828 | .000 | .910 | 15 |

As noticed from Table 8.2 all of the variables have Kaiser-Meyer-Olkin (KMO) values within the acceptable range of 0.5 and 1. The minimum obtained value is for KSS (.728) and the maximum obtained value for IO (.879). This ensures the appropriateness of performing the factor analysis in this study. Also, this indicates that common factors between the variable are available. On the other hand, Bartlett's Test (sig value) has shown values of zero for all variables, lower than the threshold of 0.05. However, if Bartlett's Test value is bigger than 0.05 then the correlation matrices will be similar to the identity matrices. Whereas the critical value of chi-square is (9.488) if the greater value obtained, there is a significant difference in the variances, and if lower than this value obtained, there is not a significant difference. In addition, the values of Cronbach Alpha showing that all variables obtained a high value of reliability and this explains a strong internal consistency of all variables and their measures used in this questionnaire.

For this study, the Principal Component Analysis (PCA) will be used to perform the factor analysis. PCA is the most common method used by the statistics and the researchers. This method applies the extraction on the maximum variance and puts them into the first factor and then removes that variance explained by the first factors. After that, it starts extracting maximum variance for the second factor and so on till the process goes to the last factor (Grimm and Yarnold, 1995). In fact, PCA is used to drive the minimum number of factors that are explaining the maximum portion of the variance in the originally identified variables. Eigenvalues indicate the variance explained by each proposed factor out of the total variance. In this study, selected factors are done based on the Kaiser Criterion, which says factors should be considered when Eigenvalues is greater than one. In the next part, a factor analysis will be carried out for the selected variables.

## 8.3. Factor Analysis for Strategy Level Measurements (SLM)

Table (8.3.1) shows the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy valued at (.879). This value confirms the suitability of the dataset used for this group. Moreover, it indicates that there might be a proportion of variance in “SLM” variable that caused by underlying factors. The Bartlett test statistic is (Approx. Chi-Square = 611.994) which is below the critical value of chi-square (9.488). To conclude that the variances are the same and have no significance differenced in this variable.

Table 8.3.1: KMO and Bartlett's Test for Strategy Level Measurements (SLM)

**KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .879 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 611.994 |
| | Df | 66 |
| | Sig. | .000 |

The principal component analysis is performed for the Strategy Level Measurements (SLM) to examine the items dimensionality. Table (8.3.2) shows variances explained for “SLM”. Looking up to the values in general, it is noticed that there are mainly (2) components have Eigenvalues greater than one that can be considered as a factor. This reveals that “SLM” is explained by those (2) components in this study. As presented in the Extraction Sums of Squared Loadings field, the first component has total Eigenvalues of (6.682), and percentage of variance of (55.683). The second component has total Eigenvalues of (1.221), and percentage of variance of (10.173). From this finding, we can conclude that in this research study (66%) of “Strategy Level Measurements (SLM)” is explained by the 2 factors, and the remaining (34%) of variance is explained by the other factors. The key output of the principal component analysis is presented in the table (8.3.3) - Rotated Component Matrix.

Table 8.3.2: Total Variance Explained for Strategy Level Measurements (SLM)

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 6.682 | 55.683 | 55.683 | 6.682 | 55.683 | 55.683 | 4.353 | 36.276 | 36.276 |
| 2 | 1.221 | 10.173 | 65.856 | 1.221 | 10.173 | 65.856 | 3.550 | 29.580 | 65.856 |
| 3 | .835 | 6.956 | 72.812 | | | | | | |
| 4 | .676 | 5.634 | 78.446 | | | | | | |
| 5 | .592 | 4.937 | 83.383 | | | | | | |
| 6 | .436 | 3.634 | 87.017 | | | | | | |
| 7 | .393 | 3.275 | 90.292 | | | | | | |
| 8 | .344 | 2.864 | 93.156 | | | | | | |
| 9 | .313 | 2.608 | 95.764 | | | | | | |
| 10 | .204 | 1.702 | 97.466 | | | | | | |
| 11 | .173 | 1.438 | 98.904 | | | | | | |
| 12 | .132 | 1.096 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.

Figure (8.3) provides further illustration of Eigenvalues for the extracted components through screen plot.

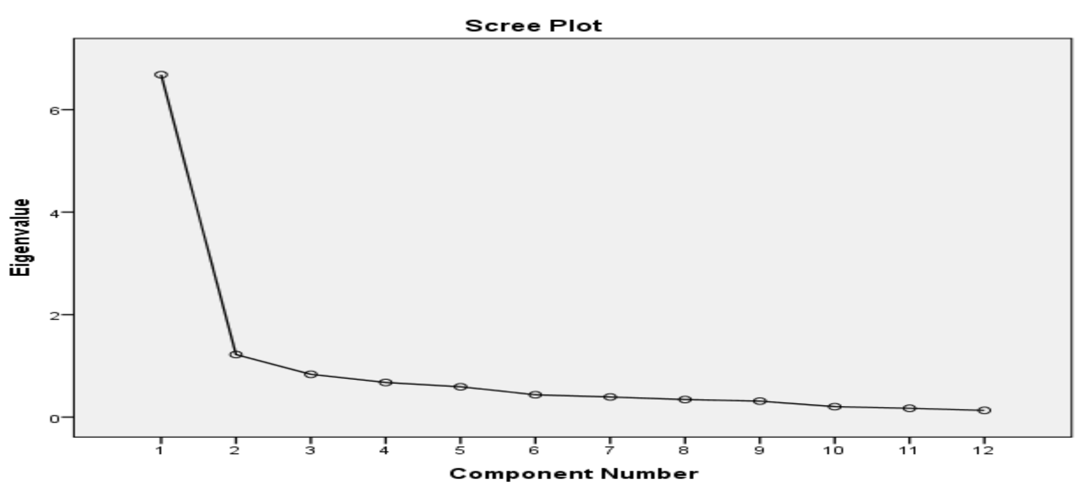



Figure 8.3: Screen Plot of Eigenvalues of Strategy Level Measurements (SLM)

Table (8.3.3) presents the relationship between each of the variables within Strategy Level Measurements (SLM) group and the proposed components. As the loading values are above the significant point of (+.45), this indicates that there is a strong correlation between (SLM5, SLM4, SLM2, SLM6, SLM1, SLM3, SLM8) and component (1). Also, there is a strong correlation between (SLM9, SLM10, SLM7, SLM11, SLM13) and component (2). Assigning each variable (with the highest significant loading value) to the proposed component will lead to the table (8.3.4).

Table 8.3.3: Rotated Component Matrix for Strategy Level Measurements (SLM)

**Rotated Component Matrix[a]**

| | Component | |
|---|---|---|
| | 1 | 2 |
| SLM5 | .856 | |
| SLM4 | .779 | |
| SLM2 | .768 | |
| SLM6 | .757 | |
| SLM1 | .719 | |
| SLM3 | .644 | |
| SLM8 | .605 | |
| SLM9 | | .846 |
| SLM10 | | .804 |
| SLM7 | | .747 |
| SLM11 | | .694 |
| SLM12 | | .653 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

This research study discovered two latent clusters of Strategy Level Measurements (SLM). Table (8.3.4) shows the determinants that make up each cluster. As illustrated in the table, there are 7 determinants assigned to the first new latent variable coded as “SLMN1” described as “Strategic Alignment” and has Cronbach Alpha value of (.904). While, there are 5 determinants assigned to the second new latent variable coded as "SLMN2" described as "Innovation Diffusion and Communication", and has Cronbach Alpha value of (.874).

Table 8.3.4: Rotated Components Matrix for Strategy Level Measurements (SLM) after Factor Analysis with new codes

| Rotated Component Matrix | | | | | | |
|---|---|---|---|---|---|---|
| **Variable Code** | **Component** | | **Cronbach Alpha** | **# of Items** | **New Code** | **New Description** |
| | **1** | **2** | | | | |
| SLM5 | .856 | | .904 | 7 | SLMN1 | Strategic Alignment |
| SLM4 | .779 | | | | | |
| SLM2 | .768 | | | | | |
| SLM6 | .757 | | | | | |
| SLM1 | .719 | | | | | |
| SLM3 | .644 | | | | | |
| SLM8 | .605 | | | | | |
| SLM9 | | .846 | .874 | 5 | SLMN2 | Innovation Diffusion and Communication |
| SLM10 | | .804 | | | | |
| SLM7 | | .747 | | | | |
| SLM11 | | .694 | | | | |
| SLM12 | | .653 | | | | |

The interpretation of the (2) new latent clusters is provided in the following subsections:

### 8.3.1. SLMN1 - Strategic Alignment

This cluster is formed from 7 strategy management practices. This emerged cluster is consistent with the literature on strategy. It is very well understood in the academic literature that the strategic alignment creates an essential element to strategic management and measurement. The organization has to align their initiatives and their portfolio of projects with corporate strategy. The finding of this research supported the studies conducted by Yolande et al. (1997); David et al. (2007); Jonas (2010); DeFillippi and Roser (2014).

Yolande et al. (1997) in their research claimed that the strategic alignment has a positive impact on business performance and the strategic configuration is a better predictor of effectiveness than is planned orientation. The consideration is very important to perform the process of linking all organizational resources and structure with its business strategy to achieve a high level of alignment. This alignment enables optimum contribution of people and other researched to organization target position and priorities through clear measurable objectives. Such a process will lead to resource optimization as it minimizes waste and eliminates efforts that have no strategic importance.

David et al. (2007) in an article entitled “Using and validating the strategic alignment model” affirmed that without strategic alignment between business and information technology organizations can’t be competitive. Their research concludes that there is a gap in understanding how alignment is operationalized and actually performed in organizations experiencing the dynamic environment. It is critical to integrate internal infrastructure and operations of resources, processes, skills, core competencies and customers’ needs with business strategy in order to transform the concept of strategic alignment into the practical method. Therefore, according to David et al. (2007), the ultimate befit of alignment can generate maximization to the return on investment, achieve competitive advantage, and setting clear direction and deploy of the flexible business model to treat to the new opportunities.

Jonas (2010) concludes that strategic alignment leads to a balanced project portfolio enabling a firm to achieve its objectives without excessive exposure to risk and providing the best value to the organization. The choice of alignment between initiatives and project objectives with strategy, resources with strategy, and reflection of strategy in the overall organization portfolio would enable clear and easy assessment criteria for measuring the benefits out of innovation initiatives. The proper contribution of innovative ideas can be envisioned from strategic stances by adhering to strategy goal and objectives.

DeFillippi and Roser (2014) found that engagement of all business units into strategic alignment process often results in the emergence of co-creative communities granting them the benefit of lower risk of failure, increased adaptability, and better communication cross-functional. Basically, the reason for the need for strategic alignment is that typical business unit has a low level of understanding regarding which innovative projects and initiatives make up their business strategy. As a result, the strategic alignment process enables and manages projects and initiatives as a holistic approach, with a unified vision and direction of the organization.

### 8.3.2. SLMN2 – Innovation Diffusion and Communication

This cluster is formed from 5 innovation diffusion and communication practices. The difference between diffusion and communication is that; communication here means a process of establishing commonness between sender and receiver of the message in order to share ideas, information, and knowledge to achieve some useful results or change. Communication is performed by transferring the message through a suitable medium. While in this instance diffusion of innovation means the spread of innovative ideas, products or processes perceived as new or improved of the existence and communicated among the participants in a social system over specific time by an individual or another unit of adoption (Rogers 2003). Thus, communication here is an intrinsic part of the innovation diffusion process. From the above definition, we can conclude that diffusion has four main elements: the innovation, communication channel, time and a social system.

Innovation is diffused by learning about their practice in different environment and this could feedback to the improvement of organizational strategy performance. The finding of this research supported the studies conducted by the Haiyang (2001); Robert and David (2008); Kawai et al. (1992).

Haiyang (2001) found that innovation performance contingent on the relationship-based strategies such as strategic alliances for new products development or for new corporate networking agreement. In addition, the result of his research suggests that there should be a simultaneous consideration for environmental and relationship factors as a mediator influence on the innovation strategy among new technology venture. It is noticed that many studies have proven the positive relationship between innovation strategy and organizational performance. However, as some empirical studies found a negative relationship, thus mediator factors need to be considered to clarify this contradiction.

Robert and David (2008) argues that diffusion of innovation starts from learning and creating a high-performance culture in which enables the continuous sharing of knowledge leading to identifying new opportunities for development and then reaching out to the financial benefits by growing revenue of newly developed products and services to increasing of institution return on capital. In understanding the wide variation of diffusion in the rate at which it occurs, cultural aspects have a strong influence on the accelerating rate of innovation adaption.

According to Kawai et al. (1992) basically, the diffusion of innovation is mainly a process driven as new ideas of how to perform thing will usually spread through learning by observing the process. This is clearly an indication of the new method of doing things is better than what went before. From a strategy perspective, diffusion of innovation is highly lead by leadership as they are the major influencer on instilling the innovation culture among their employees. Nevertheless, given the paramount importance for providing management support and communication can be an instrumental tool for new idea generation by individuals or another unit of adapters.

## 8.4. Factor Analysis for Knowledge Stage Skills (KSS)

Table (8.4.1) shows the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy valued at (.728). This value confirms the suitability of the dataset used for this group. Moreover, it indicates that there might be a proportion of variance in “KSS” variable that caused by underlying factors. The Bartlett test statistic is (Approx. Chi-Square = 508.898) which is below the critical value of chi-square (9.488). To conclude that variances are the same and have no significance differenced in this variable.

Table 8.4.1: KMO and Bartlett's Test for Knowledge Stage Skills (KSS)

**KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .728 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 508.898 |
| | Df | 105 |
| | Sig. | .000 |

The principal component analysis has been performed for the Knowledge Stage Skills (KSS) to examine the items dimensionality. Initially, factor analysis for this variable revealed that there are (4) components had a value greater than one and they explain “KSS” of this study. However, the 4$^{th}$ component had poor reliability with Cronbach Alpha value below the acceptable point of (.7). Then the factor analysis has been re-computed forcing the analysis to be done only with 3 components. This is performed by selecting the extraction option: “fixed number of factor to extract” and adding number (3) in the given field. Table (8.4.2) shows variances explained for “KSS”. Looking up to the values in general, it is noticed that there are mainly (4) components have Eigenvalues greater than one, only (3) of them can be considered as a factor due to properly loading of their variables. This reveals that “KSS” is explained by those (3) components in this study. As presented in the Extraction Sums of Squared Loadings field, the first component has total

Eigenvalues of (5.105), and percentage of variance of (34.034). The second component has total Eigenvalues of (2.006), and percentage of variance of (13.375). The third component has total Eigenvalues of (1.421), and percentage of variance of (9.472). From this finding, we can conclude that in this research study (57%) of "Knowledge Stage Skills (KSS)" is explained by the 3 factors, and the remaining (43%) of variance is explained by the other factors. The key output of the principal component analysis is presented in the table (8.4.3) - Rotated Component Matrix.

Table 8.4.2: Total Variance Explained for Knowledge Stage Skills (KSS)

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5.105 | 34.034 | 34.034 | 5.105 | 34.034 | 34.034 | 3.009 | 20.062 | 20.062 |
| 2 | 2.006 | 13.375 | 47.409 | 2.006 | 13.375 | 47.409 | 2.939 | 19.594 | 39.657 |
| 3 | 1.421 | 9.472 | 56.880 | 1.421 | 9.472 | 56.880 | 2.584 | 17.224 | 56.880 |
| 4 | 1.361 | 9.076 | 65.957 | | | | | | |
| 5 | .883 | 5.885 | 71.842 | | | | | | |
| 6 | .811 | 5.407 | 77.249 | | | | | | |
| 7 | .623 | 4.155 | 81.404 | | | | | | |
| 8 | .550 | 3.664 | 85.068 | | | | | | |
| 9 | .521 | 3.476 | 88.544 | | | | | | |
| 10 | .467 | 3.113 | 91.657 | | | | | | |
| 11 | .410 | 2.732 | 94.389 | | | | | | |
| 12 | .286 | 1.903 | 96.292 | | | | | | |
| 13 | .214 | 1.426 | 97.718 | | | | | | |
| 14 | .177 | 1.179 | 98.897 | | | | | | |
| 15 | .165 | 1.103 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.

Figure (8.4) provides further illustration of Eigenvalues for the extracted components through screen plot.

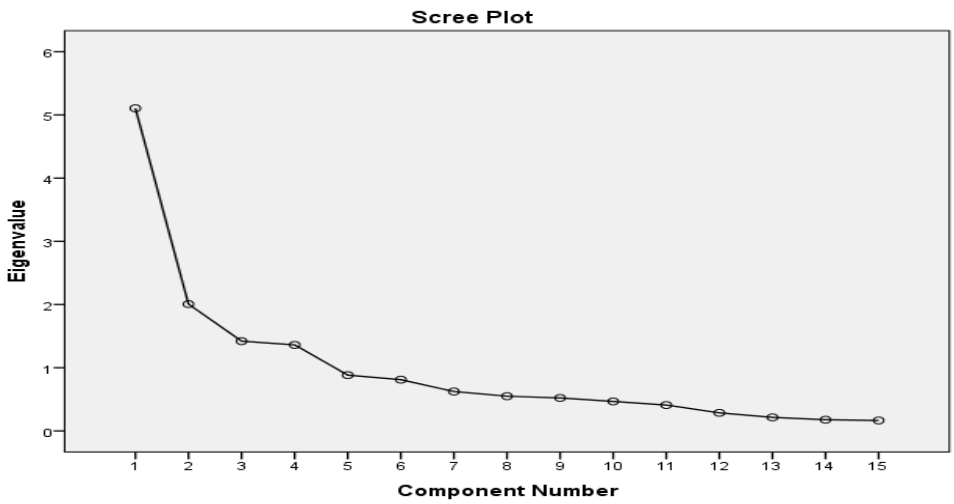



Figure 8.4: Screen Plot of Eigenvalues of Knowledge Stage Skills (KSS)

Table (8.4.3) presents the relationship between each of the variables within Knowledge Stage Skills (KSS) group and the proposed components. As the loading values are above the significant point (+.45), this indicates that there is a strong correlation between (KSS15, KSS13, KSS9, KSS1) and component (1). Also, there is a strong correlation between (KSS8, KSS7, KSS3, KSS6, KSS4, KSS2) and component (2). In addition, there is a strong correlation between (KSS12, KSS10, KSS5, KSS11, KSS14) and component (3). Assigning each variable (with the highest significant loading value) to the proposed component will lead to the table (8.4.4).

Table 8.4.3: Rotated Component Matrix for Knowledge Stage Skills (KSS)

**Rotated Component Matrix[a]**

| | Component | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| KSS15 | .869 | | |
| KSS13 | .820 | | |
| KSS9 | .754 | | |
| KSS1 | .626 | | |
| KSS8 | | .832 | |
| KSS7 | | .680 | |
| KSS3 | | .668 | |
| KSS6 | | .615 | |
| KSS4 | | .569 | |
| KSS2 | | .557 | |
| KSS12 | | | .811 |
| KSS10 | | | .740 |
| KSS5 | | | .593 |
| KSS11 | | | .562 |
| KSS14 | | | .513 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

This research study discovered (3) latent clusters of Knowledge Stage Skills (KSS). Table (8.4.4) shows the determinants that make up each cluster. As illustrated in the table, there are 4 determinants assigned to the first new latent variable coded as "KSSN1" described as "Risk-Taking" and has Cronbach Alpha value of (.810). While, there are 6 determinants assigned to the second new latent variable coded as "KSSN2" described as "Ideas Creation", and has Cronbach Alpha value of (.769). Also, there are 5 determinants assigned to the third new latent variable coded as "KSSN3" described as "Knowledge Sharing", and has Cronbach Alpha value of (.765).

Table 8.4.4: Rotated Components Matrix for Knowledge Stage Skills (KSS) after Factor Analysis with new codes

| Rotated Component Matrix | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Variable Code** | **Component** | | | **Cronbach Alpha** | **# of Items** | **New Code** | **New Description** |
| | **1** | **2** | **3** | | | | |
| KSS15 | .869 | | | .810 | 4 | KSSN1 | Risk-Taking |
| KSS13 | .820 | | | | | | |
| KSS9 | .754 | | | | | | |
| KSS1 | .626 | | | | | | |
| KSS8 | | .832 | | .769 | 6 | KSSN2 | Ideas Creation |
| KSS7 | | .680 | | | | | |
| KSS3 | | .668 | | | | | |
| KSS6 | | .615 | | | | | |
| KSS4 | | .569 | | | | | |
| KSS2 | | .557 | | | | | |
| KSS12 | | | .811 | .765 | 5 | KSSN3 | Knowledge Sharing |
| KSS10 | | | .740 | | | | |
| KSS5 | | | .593 | | | | |
| KSS11 | | | .562 | | | | |
| KSS14 | | | .513 | | | | |

The interpretation of the (3) new latent clusters are provided in the following subsections:

### 8.4.1. KSSN1 - Risk-Taking

This cluster is formed from 4 practices of knowledge stage. The emerged cluster in this level is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that risk-taking is an essential element to create innovations. The finding of this research supported the studies conducted by Lucia et al. (2007); Max (2017); and Doris et al. (2016).

Lucia et al. (2007) found that risk-taking is positively associated with reactiveness and innovation as a distinct dimension of entrepreneurial orientation. Specifically, in the public sector, risk-taking to adopt an innovation is most probably depending on the organizational context. A work environment with supportive norms across the organizational systems, processes, and policies fosters innovations through risk-sharing and more wholesome problem-solving.

Innovation is characterized as a long-term investment, therefore, it entails high uncertainties and some time has very risky decisions. Risk-taking skills become crucial in the innovation process. Max (2017) developed a framework for helping public sector innovate and deliver improved series. The framework incorporated the process by which risks are reduced and mitigated to achieve high performing organization. Within this context person with risk-taking behaviors understands how risks can be reduced and mitigated in their endeavors towards innovation deployment.

The findings of Doris et al. (2016) research study shows that senior management who are not willing to take the risk do not support innovation. Basically, being adaptable to take risks is a core skill for innovation. In essence, empowering people with practical innovation and risk-taking skills will kick-start of new idea generation and willingness to adopt the innovative ideas, which then leads to outstanding solutions and business performance.

### 8.4.2. KSSN2 – Ideas Creation

This cluster is formed from 6 practices of knowledge stage. The emerging group is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that ideas creation is an essential element of the innovation process and stimulates corporate innovation success. The finding of this research supported the studies conducted by Chen et al. (2016); Tsai (2001) and David et al. (2007).

Chen et al. (2016) in their article titled “Be nice to your innovators: Employee treatment and corporate innovation performance” explored the associated factors affecting corporate innovation performance. Their study was based on the notion of 3 principal factors and argued that corporate innovation success is critically depended on the participation of multi-dimensional employees, employee treatment and the adapted incentive scheme. Providing better employee treatment scheme leads employees to proactive approach and teamwork that stimulates effective conversion of patented ideas into commercial success. Chen et al. (2016) findings demonstrate that patented ideas of better-treated employees could be converted into a commercially successful product or processes, by which enhances organizational market value and facilitate better operating performance.

Tsai (2001) found that new ideas and knowledge are stimulated by providing employees with opportunities for learning within a multi-unit organization. This opportunity is basically to allow employees to utilize a portion of their paid time to generate innovative ideas. It is clearly understood that innovative ideas are created due to the motivated work environment and support provided to cultivate on the innovations and move them forwards.

David et al. (2007) argue that firms attempt to create wealth by identifying ideas that set the stage for competitiveness performance and create a subsequent advantage. However, in today’s extraordinary level of complexity and changes in the way of running the business, new idea creation becomes imperative to keep abreast of high demand to the creative delivery of public services and social welfare.

**8.4.3. KSSN3 – Knowledge Sharing**

This cluster is formed from 5 practices of knowledge stage. This emerged cluster is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that knowledge sharing is an essential element of the innovations process. The finding of this research supported the studies conducted by many researchers, for example, The Tsai and Ghoshal (1998); David et al. (2007); Chen et al. (2016); Zhining and Nianxin (2012).

Innovations are mainly driven by collaborative efforts, exploring collectively new ways of creating values. In line with Tsai and Ghoshal (1998) findings that inter-unit collaboration and knowledge sharing stimulates new idea generation. They argued that knowledge transfer across different functional units of the organization provides opportunities for mutual learning, and thus motives employees to further develop new ideas. While, David et al. (2007) suggest that organizations can overcome their challenges through collaborative innovation and the sharing of ideas, knowledge, opportunities, and expertise.

Chen et al. (2016) findings confirm that internal communication and knowledge sharing within organizations facilitates better future operating performance driven by well treated and motivated employees. In fact, individuals and employees' willingness are the cornerstones of the innovation process. Therefore, it is very important to provide them with a perfect atmosphere for collaboration and sharing to generate innovative ideas to overcome current challenges and for continuous improvements exertion.

The research paper of Yesil and Dereli (2013) titled "An Empirical Investigation of the Organizational Justice, Knowledge Sharing and Innovation Capability" revealed that knowledge sharing has been associated with organizational innovation capability. Whereas, organizational justice is an important concept that has a vital role in determining the knowledge sharing practices constitutes another finding of Yesil and Dereli (2013) study.

Zhining and Nianxin (2012) developed a research model explaining the relationship between knowledge sharing, innovation, and performance. After conducting an empirical study on 89 sample size, the results revealed that "both explicit and tacit knowledge sharing practices facilitate innovation and performance. Explicit knowledge sharing has more significant effects on innovation speed and financial performance while tacit knowledge sharing has more significant effects on innovation quality and operational performance" Zhining and Nianxin (2012, P. 1).

## 8.5. Factor Analysis for Persuasion Stage Skills (PSS)

Table (8.5.1) shows the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy valued at (.864). This value confirms the suitability of the dataset used for this group. Moreover, it indicates that there might be a proportion of variance in “PSS” variable that caused by underlying factors. The Bartlett test statistic is (Approx. Chi-Square = 436.539) which is below the critical value of chi-square (9.488). To conclude that variances are the same and have no significance differenced in this variable.

Table 8.5.1: KMO and Bartlett's Test for Persuasion Stage Skills (PSS)

**KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .864 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 436.539 |
| | df | 78 |
| | Sig. | .000 |

The principal component analysis has been performed for the Persuasion Stage Skills (PSS) to examine the items dimensionality. Initially, factor analysis for this variable revealed that there are (3) components had a value greater than one and they explain “PSS” of this study. However, the third component had poor loading with only one variable. Therefore, the factor analysis has been re-computed forcing the analysis to be done only with (2) components. This is performed by selecting the extraction option: “fixed number of factor to extract” and adding number (2) in the given field. Table (8.5.2) shows variances explained for “PSS”. Looking up to the values in general, it is noticed that there are mainly (3) components have Eigenvalues greater than one, only (2) of them can be considered as a factor due to properly loading of their variables. This reveals that “PSS” is explained by those (2) components in this study. As presented in the Extraction Sums of Squared Loadings field, the first component has total Eigenvalues of (5.674), and percentage of variance of (43.644). The second component has total Eigenvalues of (1.328), and percentage of variance of (10.214). From this finding, we can conclude that in this research study (54%) of "Persuasion Stage Skills (PSS)" is explained by the 2 factors, and the remaining (46%) of variance is explained by the other factors. The key output of the principal component analysis is presented in the table (8.5.3) - Rotated Component Matrix.

Table 8.5.2: Total Variance Explained for Persuasion Stage Skills (PSS)

**Total Variance Explained**

| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| Component | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5.674 | 43.644 | 43.644 | 5.674 | 43.644 | 43.644 | 3.847 | 29.589 | 29.589 |
| 2 | 1.328 | 10.214 | 53.858 | 1.328 | 10.214 | 53.858 | 3.155 | 24.269 | 53.858 |
| 3 | 1.147 | 8.823 | 62.681 | | | | | | |
| 4 | .860 | 6.616 | 69.297 | | | | | | |
| 5 | .688 | 5.296 | 74.593 | | | | | | |
| 6 | .646 | 4.970 | 79.563 | | | | | | |
| 7 | .547 | 4.205 | 83.768 | | | | | | |
| 8 | .520 | 3.997 | 87.765 | | | | | | |
| 9 | .454 | 3.492 | 91.257 | | | | | | |
| 10 | .382 | 2.939 | 94.196 | | | | | | |
| 11 | .290 | 2.234 | 96.429 | | | | | | |
| 12 | .265 | 2.042 | 98.471 | | | | | | |
| 13 | .199 | 1.529 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.

Figure (8.5) provides further illustration of Eigenvalues for the extracted components through screen plot.

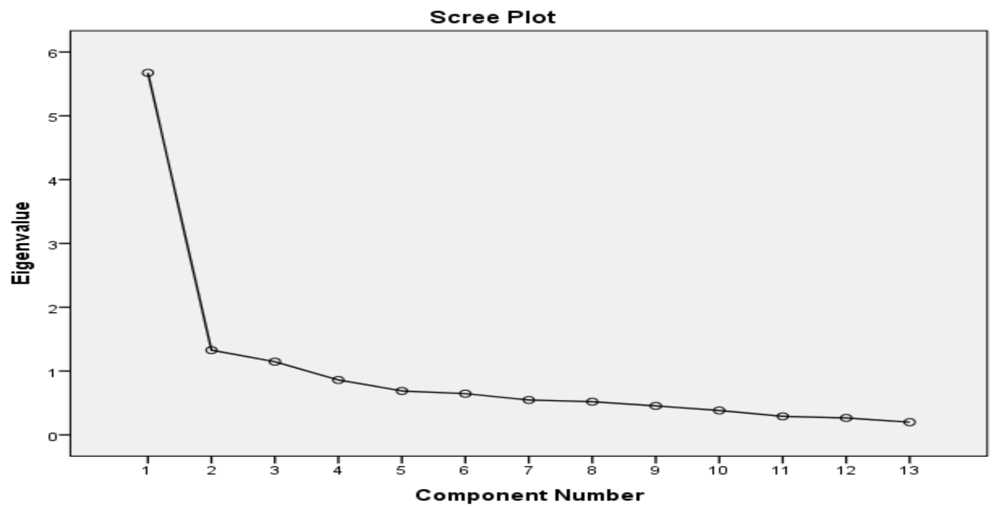



Figure 8.5: Screen Plot of Eigenvalues of Persuasion Stage Skills (PSS)

Table (8.5.3) presents the relationship between each of the variables within Persuasion Stage Skills (PSS) group and the proposed components. As the loading values are above the significant point of (+.45), this indicates that there is a strong correlation between (PSS12, PSS13, PSS4, PSS11, PSS9) and component (1), and it is more likely a moderate correlation with (PSS2, PSS6). Also, there is a strong correlation between (PSS10, PSS7, PSS5, PSS1) and component (2), and it is more likely a moderate correlation with (PSS3, PSS8). Assigning each variable (with the highest significant loading value) to the proposed component will lead to the table (8.5.4).

Table 8.5.3: Rotated Component Matrix for Persuasion Stage Skills (PSS)

**Rotated Component Matrix[a]**

| | Component | |
|---|---|---|
| | 1 | 2 |
| PSS12 | .776 | |
| PSS13 | .767 | |
| PSS4 | .732 | |
| PSS11 | .666 | |
| PSS9 | .624 | |
| PSS2 | .599 | |
| PSS6 | .551 | |
| PSS10 | | .751 |
| PSS7 | | .747 |
| PSS5 | | .678 |
| PSS1 | | .673 |
| PSS3 | | .580 |
| PSS8 | | .487 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations

This research study discovered (2) latent clusters of Persuasion Stage Skills (PSS). Table (8.5.4) shows the determinants that make up each cluster. As illustrated in the table, there are 7 determinants assigned to the first new latent variable coded as "PSSN1" described as "Problem Solving" and has Cronbach Alpha value of (.835). While, there are 6 determinants assigned to the second new latent variable coded as "PSSN2" described as "Relationship", and has Cronbach Alpha value of (.792).

Table 8.5.4: Rotated Components Matrix for Persuasion Stage Skills (PSS) after Factor Analysis with new codes

| Rotated Component Matrix | | | | | | |
|---|---|---|---|---|---|---|
| **Variable Code** | **Component** | | **Cronbach Alpha** | **# of Items** | **New Code** | **New Description** |
| | **1** | **2** | | | | |
| PSS12 | .776 | | .835 | 7 | PSSN1 | Problem Solving |
| PSS13 | .767 | | | | | |
| PSS4 | .732 | | | | | |
| PSS11 | .666 | | | | | |
| PSS9 | .624 | | | | | |
| PSS2 | .599 | | | | | |
| PSS6 | .551 | | | | | |
| PSS10 | | .751 | .792 | 6 | PSSN2 | Relationship |
| PSS7 | | .747 | | | | |
| PSS5 | | .678 | | | | |
| PSS1 | | .673 | | | | |
| PSS3 | | .580 | | | | |
| PSS8 | | .487 | | | | |

The interpretation of the (2) new latent clusters are provided in the following subsections:

### 8.5.1. PSSN1 - Problem Solving

This cluster is formed from 7 practices of persuasion stage. This emerged cluster is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that problem-solving is an essential skill to nurture innovations and create solutions. The finding of this research supported the studies conducted by many researchers such as Jesse et al. (2015); Andrea and David (2014); De Vries et al. (2014); Seok and Jung (2009).

Jesse et al. (2015) examine the implication of innovation contests on problem-solving efforts and success using data from online innovation contest platform and country level archival data. The results of their study revealed that greater problem-solving efforts exerted with a contestant from low GDB countries. In addition, performance-oriented culture has positive effects on the economy and the GDB. Wherever problem-solving is linked to innovation, both can lead to national wealth outcome. This demonstrates the significance of problem-solving as skills and efforts in orchestrating the innovation process.

Andrea and David (2014) experimented to what extent the processes underpinning problem-solving, and the associated factors influencing problem-solving in the context of innovation. They find that problem requires motor variability as an influencer factor, thus the convergent evidence that behavioral variability is key to innovations. Therefore, they recommend future research using problem-solving to investigate innovation. It is noticed that creating opportunities for the right creative thinking individuals will more likely increase their ability to express innovative behavior leading to new inventions or use of pre-existing discovery in new contexts.

In the public sector, there are an increasing number of people embraces the idea that innovation can improve public service and problem-solving capacity (De Vries et al. 2014). Seok and Jung (2009) found that there is a direct relationship between public sector leaders and implement innovative tasks effectively. However, those leaders do not only have a strong ability to explore new ideas, but also are good problem solvers. Which means problem-solving skill is critical in public sector leaders to put forward innovative ideas and effectively implement and manage them. In fact, the most effective and efficient innovators don't wait for problems to arise as they solve what isn't damaged and seek out to improve things that have no actual deficit. Many researchers believe that innovation is a choice of knowledge exploration and imagination rather than an encouragement of innovative solutions. So a plan can be formulated ahead that will tackle a number of obstacles and help achieve the goals.

### 8.5.2. PSSN2 – Relationship

This cluster is formed from 6 practices of persuasion stage. This emerged cluster is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that building a relationship is the essential skills to nurture innovations. The finding of this research supported the studies conducted by many researchers such as De Vries et al. (2014); Micheli et al. (2012); Schoeman et al (2012); Rincke (2006).

De Vries et al. (2014) addressed in their study that participation in networks and inter-organizational relationships (collaboration with private partners/involvement of citizens) comprises 22% of influential environmental factors affecting the diffusion and adaption of innovation in the public domain. In fact, the researchers (De Vries et al. 2014 and others such as Micheli et al. 2012; Schoeman et al. 2012) have linked this result of high percentage of impact to the increasing budget pressures and demands placing the need for the establishment of commercialization partnerships as an innovative approach to improve the efficiency and effectiveness of public services. Cooperation with potential business partners increases the amount of organizational compatibility in adopting innovation concepts. The research summarizes that there is a strong influence of “isomorphism”, which means organizations in the same bounders of business interests became more alike.

Rincke (2006) in his research paper found that the horizontal interaction among local governments can be stimulated through the diffusion of policy innovation. Therefore, it is important to take into account the partnership with experts in the field or conduct benchmarking exercises in local and federal government to stimulate innovation. Wherever novelty processes take place there should be a substantial portion of interactions and inter-relationship with decisions makers. Hence, building up a good relationship with concern parties in the innovation process can play a significant role in turning innovative ideas into reality.

## 8.6. Factor Analysis for Decision Stage Skills (DSS)

Table (8.6.1) shows the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy valued at (.769). This value confirms the suitability of the dataset used for this group. Moreover, it indicates that there might be a proportion of variance in "DSS" variable that caused by underlying factors. The Bartlett test statistic is (Approx. Chi-Square = 393.239) which is below the critical value of chi-square (9.488). To conclude that variances are the same and have no significance differenced in this variable.

Table 8.6.1: KMO and Bartlett's Test for Decision Stage Skills (DSS)

**KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .769 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 393.239 |
| | Df | 78 |
| | Sig. | .000 |

The principal component analysis has been performed for the Decision Stage Skills (DSS) to examine the items dimensionality. Initially, factor analysis for this variable revealed that there are (4) components had a value greater than one and they explain "DSS" of this study. However, the fourth component had poor loading with only two variables and had poor reliability below (.7). Therefore, the factor analysis has been re-computed forcing the analysis to be done only with (3) components. This is performed by selecting the extraction option: "fixed number of factor to extract" and adding number (3) in the given field. The results also revealed that component (2) have poor reliability with the loaded variables. Therefore, factor analysis has been computed again and this time forcing the analysis to be done only with (2) factors. This is performed by selecting the extraction option: "fixed number of factor to extract" and adding number (2) in the given field. Table (8.6.2) shows variances explained for "DSS". Looking up to the values in general, it is noticed that there are mainly (4) components have Eigenvalues greater than one, only (2) of them can be considered as a factor due to properly loading of their variables. This reveals that "DSS" is explained by those (2) components in this study. As presented in the Extraction Sums of Squared Loadings field, the first component has total Eigenvalues of (4.933), and percentage of variance of (37.946). The second component has total Eigenvalues of (1.383), and percentage of variance of (10.636). From this finding, we can conclude that in this research study (49%) of "Decision Stage Skills (DSS)" is explained by the (2) factors and the remaining (51%) of variance is explained by the other factors. The key output of the principal component analysis is presented in the table (8.6.3) - Rotated Component Matrix.

Table 8.6.2: Total Variance Explained for Decision Stage Skills (DSS)

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 4.933 | 37.946 | 37.946 | 4.933 | 37.946 | 37.946 | 3.489 | 26.841 | 26.841 |
| 2 | 1.383 | 10.636 | 48.582 | 1.383 | 10.636 | 48.582 | 2.826 | 21.741 | 48.582 |
| 3 | 1.156 | 8.889 | 57.471 | | | | | | |
| 4 | 1.113 | 8.563 | 66.034 | | | | | | |
| 5 | .886 | 6.818 | 72.852 | | | | | | |
| 6 | .774 | 5.955 | 78.807 | | | | | | |
| 7 | .661 | 5.081 | 83.888 | | | | | | |
| 8 | .548 | 4.214 | 88.102 | | | | | | |
| 9 | .490 | 3.768 | 91.870 | | | | | | |
| 10 | .338 | 2.603 | 94.473 | | | | | | |
| 11 | .299 | 2.304 | 96.776 | | | | | | |
| 12 | .255 | 1.964 | 98.741 | | | | | | |
| 13 | .164 | 1.259 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.

Figure (8.6) provides further illustration of Eigenvalues for the extracted components through screen plot.

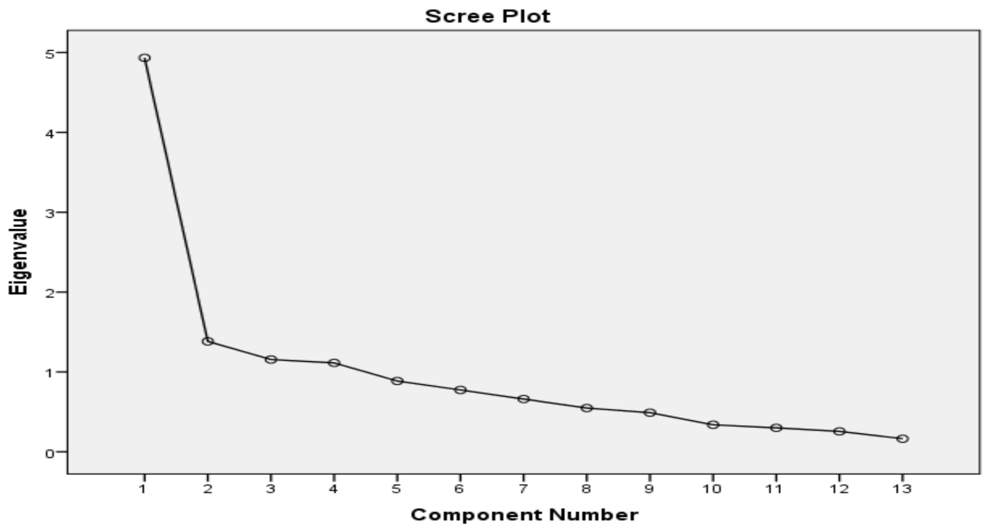



Figure 8.6: Screen Plot of Eigenvalues of Decision Stage Skills (DSS)

Table (8.6.3) presents the relationship between each of the variables within Decision Stage Skills (DSS) group and the proposed components. As the loading values are above the significant point of (+.45), this indicates that there is a strong correlation between (DSS10, DSS11, DSS9, DSS13) and component (1), and it is more likely a moderate correlation with (DSS8, DSS12). Also, there is a strong correlation between (DSS6, DSS7, DSS5, DSS4) and component (2). The analysis also shows that there is the poor loading of (DSS2, DSS1, DSS3) as they had a significant value below (+.45), therefore, they were eliminated from the study.  Assigning each variable (with the highest significant loading value) to the proposed component will lead to the table (8.6.4).

Table 8.6.3: Rotated Component Matrix for Decision Stage Skills (DSS)

**Rotated Component Matrix[a]**

| | Component | |
|---|---|---|
| | 1 | 2 |
| DSS10 | .818 | |
| DSS11 | .804 | |
| DSS9 | .786 | |
| DSS13 | .691 | |
| DSS8 | .584 | |
| DSS12 | .525 | |
| DSS6 | | .788 |
| DSS7 | | .733 |
| DSS5 | | .710 |
| DSS4 | | .643 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

This research study discovered (2) latent clusters of Decision Stage Skills (DSS). Table (8.6.4.) shows the determinants that make up each cluster. As illustrated in the table, there are 6 determinants assigned to the first new latent variable coded as "DSSN1" described as "Efficacy of Decision" and has Cronbach Alpha value of (.828). While, there are 4 determinants assigned to the second new latent variable coded as "DSSN2" described as "Authority", and has Cronbach Alpha value of (.766).

Table 8.6.4: Rotated Components Matrix for Decision Stage Skills (DSS) after Factor Analysis with new codes

| Rotated Component Matrix | | | | | | |
|---|---|---|---|---|---|---|
| **Variable Code** | **Component** | | **Cronbach Alpha** | **# of Items** | **New Code** | **New Description** |
| | **1** | **2** | | | | |
| DSS10 | .818 | | .828 | 6 | DSSN1 | Efficacy of Decision |
| DSS11 | .804 | | | | | |
| DSS9 | .786 | | | | | |
| DSS13 | .691 | | | | | |
| DSS8 | .584 | | | | | |
| DSS12 | .525 | | | | | |
| DSS6 | | .788 | .766 | 4 | DSSN2 | Authority |
| DSS7 | | .733 | | | | |
| DSS5 | | .710 | | | | |
| DSS4 | | .643 | | | | |

The interpretation of the (2) new latent clusters are provided in the following subsections:

### 8.6.1. DSSN1 - Efficacy of Decision

This cluster is formed from 6 practices of decision stage. This emerged cluster is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that decision making is an essential skill to nurture innovations. The finding of this research supported and consistent with other studies conducted by many researchers such as Krueger and Brazeal (1994); Daniel (2005); Rincke (2006); Carol and Aimee (2006).

Researchers have considerably associated the decision making with self-efficacy as an individual believes on his or her ability to take a course of action and deal with challenges. Self-efficacy defined as a personal judgment of people's beliefs about their capabilities to organize information and execute a course of action in order to navigate a prospective situation and produce a favorable outcome.

Krueger and Brazeal (1994) found that individuals with high levels of self-efficacy and confidence can better recognize opportunities. People who believe they are competent to lead the decision making take more risks throughout the opportunities, and vice versa. Daniel (2005) conducted a study on the self-efficacy of entrepreneurial. A study encompassing tasks related to different business aspects such as innovation, financial management, risk-taking, marketing, and general management. The results exhibit that entrepreneurs with a strong belief in their capabilities to make strategic decisions are more comprehensive in the information incorporation in which enhances firm performance.

Rincke (2006) suggest that in the development of policy innovation in the public domains, the decision of adaption innovation can be positively influenced by cross-governmental entities if the information is shared among the reference group. This emphasis on the importance of involving all concerned parties to better understand constituents' and stakeholders' needs; who will be mainly affected by the innovation in the earlier stage of the decision-making process. Consequently, and as the beneficiary parties of the innovation will be incentivized throughout the adaption process, the road to the success and achievement of goals will be paved; with very limited obstacles and challenges.

Carol and Aimee (2006) stressed that government is struggling in setting up the budget, thus find out that involvement of citizens in playing a role in the budgeting related decisions and allocation of resources can enhance trust and build a sense of community as a long-term impact. It is clearly understood that the participation of citizens in the decision-making process can stimulate the delivery of governmental innovations and contribute to the creation of public goods.

### 8.6.2. DSSN2 – Authority

This cluster is formed from 4 practices of decision stage. This emerged cluster is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that having the right authority to take action is an essential element to nurture innovations. The finding of this research supported and consistent with other studies conducted by many researchers such as Autor (2015); Phyra and Aron (2015); Kasemsap (2017).

Authority innovation decision related to the forces of superordinate power position upon an individual, group or other units adapts the innovation. The authoritative person can make a decision that reflects the entire social system. Nevertheless, solely dependent of innovation decision may not support the optimum method for achieving the best result, while using the authority to collectively make the decision in agreement with other social system members would have greater results and a higher level of satisfaction. Autor (2015) findings suggest that giving flexible enough decisions for each new opportunity will enable quickly changing direction to exploit better adaption of the innovative idea. Having the right authority power and use it in a balanced manner enables the decision to unite to draw upon collectively making a conclusion and achieving consensus; rather than exerting authoritative power using top-down approach "must do" which may yield unfavorable outcomes.

Phyra and Aron (2015) in their study titled "Achieving service quality through service innovation exploration-exploitation: the critical role of employee empowerment and slack resources" find out that providing employees with right empowerment tool and delegated authority enhances the relationship between exploratory and exploitative service innovation and service quality. On the other hand, Kasemsap (2017) explained in his research study titled "Developing a Unified Framework and a Causal Model of Transformational Leadership, Empowerment, Innovation Support, and Organizational Innovation" that transformational leadership is positively correlated with empowerment. While he found that innovation support is playing a positive mediation role between transformational leadership and organizational innovation. In addition, innovation support positively mediates the relationship between empowerment and organizational innovation. Empowerment is a critical business tool when firms would like to pursue combined service innovation, as it offers employees with substantial decision-making authority that help them to tolerate customized solutions, in which they can enhance their ability to create and deliver innovative services. Organizations should carefully design their authority matrix to nurture appropriate empowerment to facilitate innovation support.

## 8.7. Factor Analysis for Implementation Stage Skills (ISS)

Table (8.7.1) shows the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy valued at (.738). This value confirms the suitability of the dataset used for this group. Moreover, it indicates that there might be a proportion of variance in "ISS" variable that caused by underlying factors. The Bartlett test statistic is (Approx. Chi-Square = 553.660) which is below the critical value of chi-square (9.488). To conclude that variances are the same and have no significance differenced in this variable.

Table 8.7.1: KMO and Bartlett's Test for Implementation Stage Skills (ISS)

**KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .738 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 553.660 |
| | df | 105 |
| | Sig. | .000 |

The principal component analysis has been performed for the Implementation Stage Skills (ISS) to examine the items dimensionality. Initially, factor analysis for this variable revealed that there are (4) components had a value greater than one and they explain "ISS" of this study. However, the second and the third components had poor loading with only two variables, while the fourth component had poor reliability below the acceptable value of (.7). Therefore, the factor analysis has been re-computed forcing the analysis to be done only with (3) components. This is performed by selecting the extraction option: "fixed number of factor to extract" and adding number (3) in the given field.

The results revealed that the third component had poor loading with only two variables and had poor reliability as well. Therefore, factor analysis has been computed again and this time forcing the analysis to be done only with (2) factors. This is performed by selecting the extraction option: "fixed number of factor to extract" and adding number (2) in the given field. Table (8.7.2) shows variances explained for "ISS". Examining the values in general, it is noticed that there are mainly (4) components have Eigenvalues greater than one, only (2) of them can be considered as a factor due to properly loading of their variables.

This reveals that "ISS" is explained by those (2) components in this study. As presented in the Extraction Sums of Squared Loadings field, the first component has total Eigenvalues of (5.778), and percentage of variance of (38.522). The second component has total Eigenvalues of (1.673), and percentage of variance of (11.156). From this finding, we can conclude that in this research study (50%) of "Implementation Stage Skills (ISS)" is explained by the (2) factors and the remaining (50%) of variance is explained by the other factors. The key output of the principal component analysis is presented in the table (8.7.3) - Rotated Component Matrix.

Table 8.7.2: Total Variance Explained for Implementation Stage Skills (ISS)

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5.778 | 38.522 | 38.522 | 5.778 | 38.522 | 38.522 | 4.569 | 30.461 | 30.461 |
| 2 | 1.673 | 11.156 | 49.678 | 1.673 | 11.156 | 49.678 | 2.882 | 19.216 | 49.678 |
| 3 | 1.288 | 8.588 | 58.266 | | | | | | |
| 4 | 1.071 | 7.138 | 65.404 | | | | | | |
| 5 | .898 | 5.985 | 71.389 | | | | | | |
| 6 | .816 | 5.438 | 76.827 | | | | | | |
| 7 | .687 | 4.581 | 81.407 | | | | | | |
| 8 | .605 | 4.030 | 85.438 | | | | | | |
| 9 | .519 | 3.461 | 88.899 | | | | | | |
| 10 | .467 | 3.111 | 92.009 | | | | | | |
| 11 | .375 | 2.499 | 94.508 | | | | | | |
| 12 | .311 | 2.075 | 96.583 | | | | | | |
| 13 | .247 | 1.649 | 98.232 | | | | | | |
| 14 | .167 | 1.111 | 99.343 | | | | | | |
| 15 | .099 | .657 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.

Figure (8.7) provides further illustration of Eigenvalues for the extracted components through screen plot.

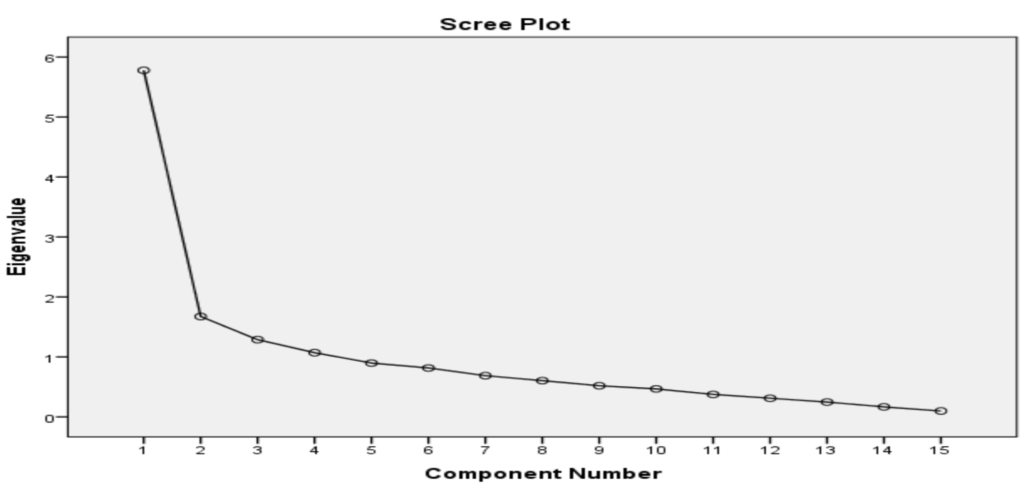



Figure 8.7: Screen Plot of Eigenvalues of Implementation Stage Skills (ISS)

Table (8.7.3) presents the relationship between each of the variables within the Implementation Stage Skills (ISS) group and the proposed components. As the loading values are above the significant point of (+.45), this indicates that there is a strong correlation between (ISS9, ISS11, ISS1, ISS3, ISS4, ISS12, ISS2, ISS7, ISS10) and component (1), and it is more likely a moderate correlation with (ISS8, ISS15). Also, there is a strong correlation between (ISS14, ISS13, ISS5) and component (2), and it is more likely a moderate correlation with (ISS6). Assigning each variable (with the highest significant loading value) to the proposed component will lead to the table (8.7.4).

Table 8.7.3: Rotated Component Matrix for Implementation Stage Skills (ISS)

**Rotated Component Matrix[a]**

| | Component | |
|---|---|---|
| | 1 | 2 |
| ISS9 | .720 | |
| ISS11 | .690 | |
| ISS1 | .669 | |
| ISS3 | .668 | |
| ISS4 | .640 | |
| ISS12 | .638 | |
| ISS2 | .630 | |
| ISS7 | .611 | |
| ISS10 | .609 | |
| ISS8 | .523 | |
| ISS15 | .476 | |
| ISS14 | | .811 |
| ISS13 | | .804 |
| ISS5 | | .779 |
| ISS6 | | .565 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

This research study discovered (2) latent clusters of Implementation Stage Skills (ISS). Table (8.7.4) shows the determinants that make up each cluster. As illustrated in the table, there are 11 determinants assigned to the first new latent variable coded as "ISSN1" described as "Accountability" and has Cronbach Alpha value of (.861). While, there are 4 determinants assigned to the second new latent variable coded as "ISSN2" described as "Leadership", and has Cronbach Alpha value of (.762).

Table 8.7.4: Rotated Components Matrix for Implementation Stage Skills (ISS) after Factor Analysis with new codes

| Rotated Component Matrix | | | | | | |
|---|---|---|---|---|---|---|
| **Variable Code** | **Component** | | **Cronbach Alpha** | **# of Items** | **New Code** | **New Description** |
| | **1** | **2** | | | | |
| ISS9 | .720 | | .861 | 11 | ISSN1 | Accountability |
| ISS11 | .690 | | | | | |
| ISS1 | .669 | | | | | |
| ISS3 | .668 | | | | | |
| ISS4 | .640 | | | | | |
| ISS12 | .638 | | | | | |
| ISS2 | .630 | | | | | |
| ISS7 | .611 | | | | | |
| ISS10 | .609 | | | | | |
| ISS8 | .523 | | | | | |
| ISS15 | .476 | | | | | |
| ISS14 | | .811 | .762 | 4 | ISSN2 | Leadership |
| ISS13 | | .804 | | | | |
| ISS5 | | .779 | | | | |
| ISS6 | | .565 | | | | |

The interpretation of the (2) new latent clusters are provided in the following subsections:

### 8.7.1. ISSN1 – Accountability

This cluster is formed from 11 practices of implementation stage. This emerged cluster is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that accountability is essential to nurture innovations. The finding of this research supported and consistent with other studies conducted by many researchers such as Regina (2006); David and Ted (1992); Eva (2012).

Regina (2006) suggests six forces affecting innovation either positively or negatively. They are accountability, technology, customers, public policy, funding, and industry players. Those forces; individually or in combination can affect the efforts of innovation. The consumers' demands increase the accountability to produce safe, effective, and cost-effective competing products. Innovation in the public arena often understood as a positive indication of the health of governmental institutions. David and Ted (1992) stress that innovation of public sector means that policymakers are responsible to leverage on new innovative ideas that seen as a preference of the citizens and changing of the social environment to better quality conditions.

As the demands for innovation grow, Eva (2012) conducted a study exploring the transformation from the traditional form of government to the new public management reforms that aim to enhance the innovative capacity of the public sector. The researcher developed "new public management" model of accountability that basically fits a form of governance aims to enhance the flexibility and innovative capability of the government sector. The growing demand for innovation urged the researches to embed the innovation in the public sector governance forms through accountability model. Therefore, it is noticed that there is a relationship between accountably and innovation; as a result, it may enhance the innovativeness of public governance.

### 8.7.2. ISSN2 – Leadership

This cluster is formed from 4 practices of implementation stage. This emerged cluster is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that leadership skills are essential for nurturing innovations in the public sector. The finding of this research supported and consistent with other studies conducted by many researchers such as Kim and Lee (2009); Kasemsap (2017); Sandford (2002); Mehmet and David (2017).

Kim and Lee (2009) found a direct positive relationship between public sector leaders and implement innovation task effectivity. However, those leaders are not only good at exploring innovative ideas, but also a role model in anticipating problems and proactively solve them. While, Kasemsap (2017) found that a positive relationship between transformational leadership and organizational innovation, and this relationship is mediated by the innovation support to the organizational systems and policies. It is clearly understood that leaders play a significant role in making work environment supportive and accountable that encourages actors to continuously put forward innovative ideas.

Sandford (2002) studied leadership and novelty in the public sector making use of quantitative data collected from public sector innovation awards. He found that leader can create a supportive work climate for bottom-up innovation. This can be assured through consulting staff at the lower organizational level, introducing official awards that incorporate recognition scheme for innovators, promotions, and provide innovators more space to freely act on their innovative ideas. Those leadership behaviors and practices create a healthy environment for generating new ideas and act upon them.

Mehmet and David (2017) studied the likelihood of innovative activity in public sector by utilizing the quantitative data gathered from Australian Public Service Commission (n=21,093) and developed a research paper titled “Conditions for innovation in public sector organizations”. The empirical evidence concludes that the likelihood of innovative activities can be enhanced by experimentation, the existence of a feedback loop, responding to low performers, and motivation to make improvements. Interestingly, all mentioned factors are either business concepts or management behaviors; mainly leveraged by leadership/top management in the organization. They are the one builds-up such norm within the organizational culture. Thus, their role in enhancing the likelihood of innovation activity become more of critical influencing attributes to the intrinsic factors of experimentation and motivation.

## 8.8. Factor Analysis for Scaling-up Stage Skills (SSS)

Table (8.8.1) shows the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy valued at (.828). This value confirms the suitability of the dataset used for this group. Moreover, it indicates that there might be a proportion of variance in “SSS” variable that caused by underlying factors. The Bartlett test statistic is (Approx. Chi-Square = 655.348) which is below the critical value of chi-square (9.488). To conclude that variances are the same and have no significance differenced in this variable.

Table 8.8.1: KMO and Bartlett's Test for Scaling-up Stage Skills (SSS)

**KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .828 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 655.348 |
| | Df | 105 |
| | Sig. | .000 |

The principal component analysis has been performed for the Scaling-up Stage Skills (SSS) to examine the items dimensionality. Initially, factor analysis for this variable revealed that there are (4) components had a value greater than one and they explain “SSS” of this study. However, the third and the fourth components had poor loading with only two variables, while the fourth component had poor reliability as well valued below the acceptable point of (.7). Therefore, the factor analysis has been re-computed forcing the analysis to be done only with (3) components. This is performed by selecting the extraction option: “fixed number of factor to extract” and adding number (3) in the given field.

The results revealed that the second component had poor loading with only two variables and had poor reliability as well. Therefore, factor analysis has been computed again and this time forcing the analysis to be done only with (2) factors. This is performed by selecting the extraction option: “fixed number of factor to extract” and adding number (2) in the given field. Table (8.8.2) shows variances explained for “SSS”. Looking up to the values in general, it is noticed that there are mainly (4) components have Eigenvalues greater than one, only (2) of them can be considered as a factor due to properly loading of their variables.

This reveals that “SSS” is explained by those (2) components in this study. As presented in the Extraction Sums of Squared Loadings field, the first component has total Eigenvalues of (6.758), and percentage of variance of (45.051). The second component has total Eigenvalues of (1.511), and percentage of variance of (10.075). From this finding, we can conclude that in this research study (55%) of “Scaling-up Stage Skills (SSS)” is explained by the (2) factors and the remaining (45%) of variance is explained by the other factors. The key output of the principal component analysis is presented in the table (8.8.3) - Rotated Component Matrix.

Table 8.8.2: Total Variance Explained for Scaling-up Stage Skills (SSS)

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 6.758 | 45.051 | 45.051 | 6.758 | 45.051 | 45.051 | 5.345 | 35.634 | 35.634 |
| 2 | 1.511 | 10.075 | 55.126 | 1.511 | 10.075 | 55.126 | 2.924 | 19.492 | 55.126 |
| 3 | 1.169 | 7.794 | 62.920 | | | | | | |
| 4 | 1.077 | 7.179 | 70.099 | | | | | | |
| 5 | .898 | 5.989 | 76.088 | | | | | | |
| 6 | .727 | 4.845 | 80.933 | | | | | | |
| 7 | .547 | 3.645 | 84.578 | | | | | | |
| 8 | .507 | 3.383 | 87.961 | | | | | | |
| 9 | .396 | 2.639 | 90.599 | | | | | | |
| 10 | .328 | 2.188 | 92.787 | | | | | | |
| 11 | .313 | 2.086 | 94.874 | | | | | | |
| 12 | .273 | 1.820 | 96.694 | | | | | | |
| 13 | .185 | 1.232 | 97.926 | | | | | | |
| 14 | .175 | 1.166 | 99.092 | | | | | | |
| 15 | .136 | .908 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.

Figure (8.8) provides further illustration of Eigenvalues for the extracted components through screen plot.

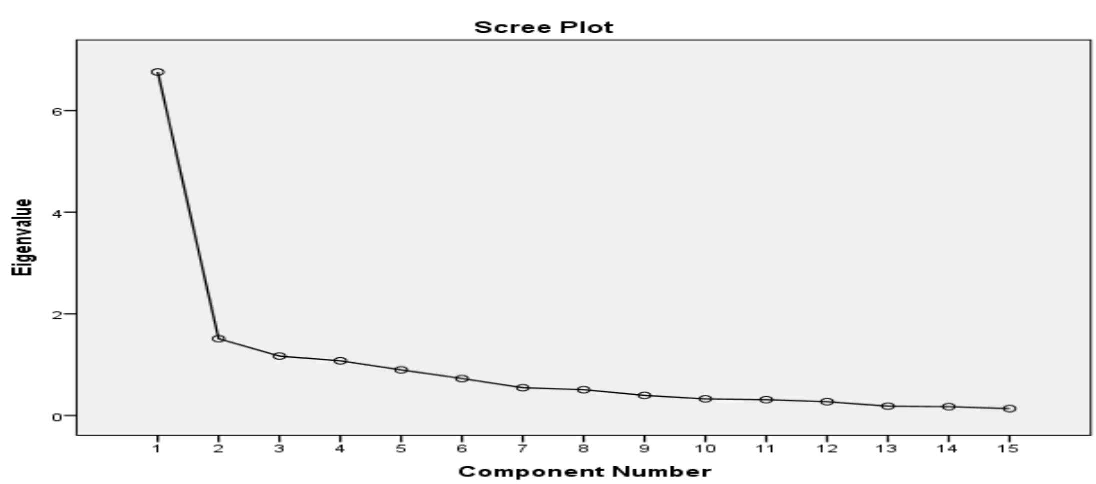



Figure 8.8: Screen Plot of Eigenvalues of Scaling-up Stage Skills (SSS)

Table (8.8.3) presents the relationship between each of the variables within Scaling-up Stage Skills (SSS) group and the proposed components. As the loading values are above the significant point of (+.45), this indicates that there is a strong correlation between (SSS15, SSS13, SSS7, SSS8, SSS11, SSS12, SSS14, SSS9, SSS10, SSS6) and component (1), and it is more likely a moderate correlation with (SSS5). Also, there is a strong correlation between (SSS1, SSS2, SSS4, SSS3) and component (2). Assigning each variable (with the highest significant loading value) to the proposed component will lead to the table (8.8.4).

Table 8.8.3: Rotated Component Matrix for Scaling-up Stage Skills (SSS)

**Rotated Component Matrix**

| | Component | |
|---|---|---|
| | 1 | 2 |
| SSS15 | .816 | |
| SSS13 | .784 | |
| SSS7 | .712 | |
| SSS8 | .710 | |
| SSS11 | .702 | |
| SSS12 | .688 | |
| SSS14 | .673 | |
| SSS9 | .638 | |
| SSS10 | .623 | |
| SSS6 | .612 | |
| SSS5 | .506 | |
| SSS1 | | .781 |
| SSS2 | | .779 |
| SSS4 | | .767 |
| SSS3 | | .609 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

This research study discovered (2) latent clusters of Scaling-up Stage Skills (SSS). Table (8.8.4) shows the determinants that make up each cluster. As illustrated in the table, there are 11 determinants assigned to the first new latent variable coded as "SSSN1" described as "Augmentation" and has Cronbach Alpha value of (.906). While, there are 4 determinants assigned to the second new latent variable coded as "SSSN2" described as "Management Support", and has Cronbach Alpha value of (.775).

Table 8.8.4: Rotated Components Matrix for Scaling-up Stage Skills (SSS) after Factor Analysis with new codes

| Rotated Component Matrix | | | | | | |
|---|---|---|---|---|---|---|
| **Variable Code** | **Component** | | **Cronbach Alpha** | **# of Items** | **New Code** | **New Description** |
| | **1** | **2** | | | | |
| SSS15 | .816 | | .906 | 11 | SSSN1 | Augmentation |
| SSS13 | .784 | | | | | |
| SSS7 | .712 | | | | | |
| SSS8 | .710 | | | | | |
| SSS11 | .702 | | | | | |
| SSS12 | .688 | | | | | |
| SSS14 | .673 | | | | | |
| SSS9 | .638 | | | | | |
| SSS10 | .623 | | | | | |
| SSS6 | .612 | | | | | |
| SSS5 | .506 | | | | | |
| SSS1 | | .781 | .775 | 4 | SSSN2 | Management Support |
| SSS2 | | .779 | | | | |
| SSS4 | | .767 | | | | |
| SSS3 | | .609 | | | | |

The interpretation of the (2) new latent clusters are provided in the following subsections:

### 8.8.1. SSSN1 – Augmentation

This cluster is formed from 11 practices of the scaling-up stage. This emerged cluster is consistent with the literature on innovation diffusion. It is very well understood in the academic literature that augmentation is an essential element for nurturing innovations in the public sector. Augmentation here means the action or process of making or becoming greater in size or amount. Thus, in business terms, researches use service augmentation meaning that the components added to service to increase customer satisfaction and improve its competitiveness. The finding of this research supported and consistent with other studies conducted by many researchers such as Chris and Christopher (1998); Phillips et al. (2015); Mulgan (2006).

Chris and Christopher (1998) conducted a study on financial services industry in the U.K. The study examines the relative contributions of service augmentation offering components to the success of new services and the organization performance in general. The study's results suggest that improving service products leads the firm to explore new opportunities. While investing in training the staff and acquiring knowledge of the market and understand customer needs leads to enhanced service augmentation which will significantly affect profitability. In addition, providing marketing support will improve the firm's performance. The scaling-up process can be performed through product and service augmentation, where the benefits spread out to a larger scale. Noticeably, service offering develops effectively when it comes from the customer's perspective.

Phillips et al. (2015) imposed the importance of networking activities to support social innovations through appropriate support mechanisms. The researcher concludes that networks have a significant role in supporting innovation and scaling-up performance of business initiatives. Thus, collaborative efforts facilitate the allocation of resources, increase networking and sharing ideas, knowledge, and skills to improve the scaling process. While learning from experience and mistakes leads to scaling-up innovative ideas successfully.

Besides, Mulgan (2006) supports the same notion as he identified the reason for the failure of many social innovations. He found that lack of collaborative and networking efforts may place significant barriers to scale-up innovation. Therefore, recognizing opportunities for change and improvement facilitates the scaling process and leads to pursuing an opportunity and bringing an innovation to fruition. This could lead also to the endurance of obstacles in order to provide a foundation on which the implementers can scale-up the adoption of innovation.

#### 8.8.2. SSSN2 – Management Support

This cluster is formed from 4 practices of the scaling-up stage. This emerged cluster is considerably consistent with the literature on innovation diffusion. It is very well understood in the academic literature that management support is an essential element for nurturing innovations in the public sector. The finding of this research supported and consistent with other studies conducted by many researchers such as Raipa and Giedraityte (2014); Ross (2009); Eshaq et al. (2017); Hsiu-Fen (2007); Maria and Jose (2016)

Raipa and Giedraityte (2014) found three types of barriers to efficient innovation processes; they are political, internal, and external barriers. With regard to the internal constraints, according to Raipa and Giedraityte (2014), the influencer related factors may include lack of management support for the workers, insufficient incentives, staff resistance, and a risk-averse culture. Therefore, to improve innovation in the public sector, the study recommended strong management support.

Ross (2009) studied the top factor leading to innovation success. The research shows that understanding customer needs is considered as the top factor, and this is followed by having management support, cross-functional team, systematic process, and right skill. It is considerably noticed that management support become a common factor in most of the innovation diffusion researches. As a result, management support positively correlated with innovation success. On the other hand, lack of management support could lead to fruitless innovation activities.

Eshaq et al. (2017) utilized the data from 210 industrial companies for their research study titled “The Effect of Top Management Support on Innovation: The Mediating Role of Synergy Between Organizational Structure and Information Technology”. The study revealed that top management support affects product innovation and process innovation. The study also exposed that the synergy between organizational structure and information technology is not mediating between management support and innovation.

In line with other related researchers’ studies, Hsiu-Fen (2007) analyzed 172 responses from employees belong to 50 large organizations. He aimed to study whether the influence of individual, organizational, and technological factors lead to superior firm innovation capability. The results indicate that top management support as organizational support factor significantly influence knowledge sharing process while sharing the knowledge enable the firm to improve innovation capability. This includes employees’ willingness whether to donate the knowledge or to collect the needed knowledge. Here the management support should foster the knowledge sharing activities and behaviors in order to maximize organizational innovation capabilities.

In the same context, Maria and Jose (2016) stressed that literature gave more attention to critical success factor product innovation than for service innovation. Therefore, the researchers inspired to conduct a study aiming to analyze the interrelationships among critical success factors in service innovation including; top management support, cross-functional communication, innovative culture. The results indicate that during the new service development process the effective top management support fosters innovation project.

## 8.9. Summary

This chapter mainly performed factor analysis to test the validity and reliability of the study instrument. Using this technique has resulted in data reduction to a smaller set of summarized variables. It is explained that the study consists of 3 main construct; performance level measurement, innovation skills, and innovation outcomes. Several tests have been used to ensure reliability and proper loading of the items mainly through Cronbach Alfa. The data also examined the outcomes of the Kaiser-Meyer-Olkin Measure of Sampling Adequacy to ensure appropriateness of the factor analysis in which all selected variables were valid for the test. The analysis results in 13 new latent variables, while only 3 items have been excluded from the study due to their poorly loading and weak reliability.

# 9. CHAPTER NINE: CORRELATION AND REGRESSION ANALYSIS

## 9.1. Introduction

This chapter discusses and the critical results of performed correction and regression test. The bases for the relationships assumed in the proposed theoretical framework is illustrated and discussed in chapter 4. In addition, the correlations and regression analysis in this chapter will consider the new latent variables explored after conducting factor analysis. The examination will also involve an in-depth valuation of the variable that may have moderation influence on the relationship. The results will mainly focus on the significant relationships between the variables.

## 9.2. Correlation Analysis

Correlation analysis simply measures the degree to which two variables vary together. In essence, with correlation coefficient calculation there are no assumptions that test whether the relationship between the two variables is causal. This means it does not undertake whether one variable is influencing the value of the other variable.

As shown in figure 9.1, this research study consists of 3 main constructs. The first construct is “Innovation Performance Measurement (IPM)” which consist of PLM, PrLM, PoLM, SLMN1, SLMN2, GCLM. The second construct is “Innovation Skills” which consist of KSSN1, KSSN2, KSSN3, PSSN1, PSSN2, DSSN1, DSSN2, ISSN1, ISSN2, SSSN1, SSSN2. The third construct is “Innovation Outcomes” which consists of SO, EO, PSO. As noticed the new latent variables has been associated with their clusters and taken into account in the correlation analysis.

The correlation analysis is performed between the 3 main constructs of this research study. Which are explained as follows:

- "Innovation Performance Measurements" including (PLM, PrLM, PoLM, SLMN1, SLMN2, GCLM) and "Innovation Skills" including (KSSN1, KSSN2, KSSN3, PSSN1, PSSN2, DSSN1, DSSN2, ISSN1, ISSN2, SSSN1, SSSN2).
- "Innovation Performance Measurements" including (PLM, PrLM, PoLM, SLMN1, SLMN2, GCLM) and "Innovation Outcomes" including (SO, EO, PSO).
- "Innovation Skills" including (KSSN1, KSSN2, KSSN3, PSSN1, PSSN2, DSSN1, DSSN2, ISSN1, ISSN2, SSSN1, SSSN2) and "Innovation Outcomes" including (SO, EO, PSO).

The dependent variable of this research study is "Innovation Outcomes (IO)", while the independent variables are "Innovation Performance Measurement (IPM)" and "Innovation Skills (IS)".

The assumption is that at each performance measurement level the innovation outcome is measured against the skills required in each innovation stage, as correlation analysis between independent variables (IPM and IS) – correlations shown in Table 9.1. In addition, the performance of innovation at each level as the independent variable is measured with each output of innovation outcomes as the dependent variable (IPM and IO) – correlations shown in table 9.2. Moreover, the innovation skills as an independent variable are measured against each output of innovation outcomes as the dependent variable (IS and IO) – correlations are shown in table 9.3.

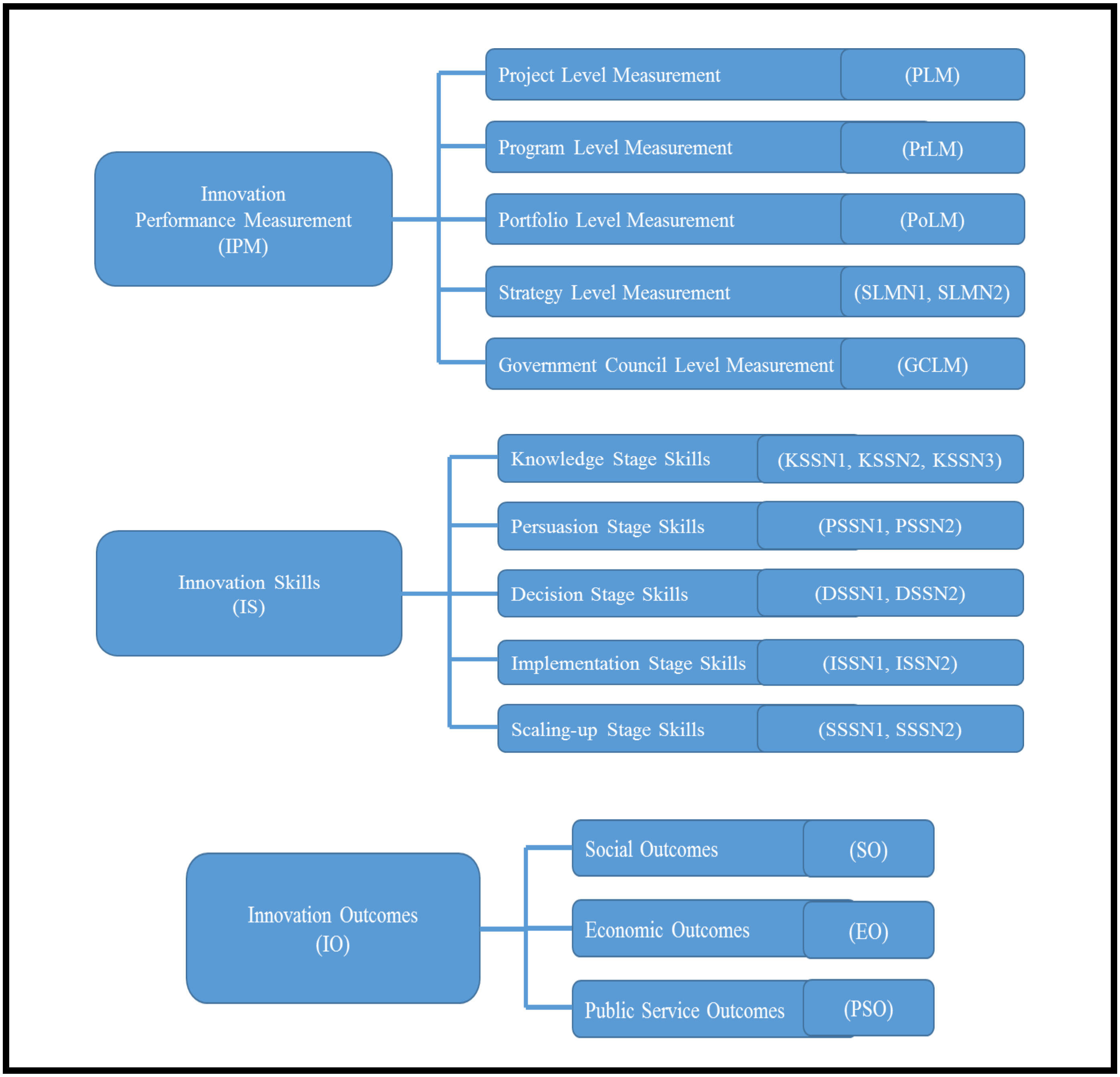



Figure 9.1: Research Main Constructs

## 9.3. Correlation between Innovation Performance Measurements and Innovation Skills

Table 9.1 shows the correlation coefficient between innovation performance measurements and innovation skills. Several correlations observed in the table explained in the following paragraph.

Table 9.1: Correlation Coefficient between Innovation Performance Measurements and Innovation Skills

**Correlations**

| Spearman's rho | | KSSN1 | KSSN2 | KSSN3 | PSSN1 | PSSN2 | DSSN1 | DSSN2 | ISSN1 | ISSN2 | SSSN1 | SSSN2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PLM1 | Correlation Coefficient | 0.062 | 0.122 | 0.042 | .266* | .230* | 0.023 | 0.05 | 0.155 | -0.077 | 0.191 | .235* |
| | Sig. (2-tailed) | 0.588 | 0.284 | 0.715 | 0.018 | 0.041 | 0.838 | 0.659 | 0.173 | 0.501 | 0.092 | 0.037 |
| PLM2 | Correlation Coefficient | .258* | 0.132 | 0.143 | 0.167 | 0.196 | -0.042 | 0.126 | 0.097 | -0.149 | 0.026 | 0.057 |
| | Sig. (2-tailed) | 0.022 | 0.245 | 0.208 | 0.141 | 0.084 | 0.711 | 0.27 | 0.393 | 0.19 | 0.818 | 0.619 |
| PLM3 | Correlation Coefficient | 0.055 | .294** | 0.163 | .250* | 0.19 | 0.045 | 0.012 | 0.146 | -0.097 | 0.198 | .229* |
| | Sig. (2-tailed) | 0.631 | 0.009 | 0.151 | 0.026 | 0.094 | 0.697 | 0.919 | 0.198 | 0.397 | 0.081 | 0.042 |
| PLM4 | Correlation Coefficient | .223* | .253* | .242* | .222* | 0.168 | -0.068 | 0.035 | 0.142 | -0.037 | 0.092 | .291** |
| | Sig. (2-tailed) | 0.048 | 0.025 | 0.032 | 0.049 | 0.139 | 0.552 | 0.76 | 0.212 | 0.746 | 0.42 | 0.009 |
| PLM5 | Correlation Coefficient | .283* | .228* | .266* | 0.201 | .245* | -0.043 | 0.086 | 0.185 | -0.012 | 0.162 | 0.1 |
| | Sig. (2-tailed) | 0.012 | 0.043 | 0.018 | 0.076 | 0.029 | 0.704 | 0.452 | 0.103 | 0.919 | 0.153 | 0.381 |
| PrLM1 | Correlation Coefficient | 0.175 | 0.176 | 0.111 | .260* | 0.111 | -0.11 | -0.032 | 0.057 | -0.03 | 0.111 | 0.056 |
| | Sig. (2-tailed) | 0.123 | 0.122 | 0.33 | 0.021 | 0.331 | 0.333 | 0.782 | 0.62 | 0.795 | 0.329 | 0.625 |
| PrLM2 | Correlation Coefficient | .243* | 0.194 | 0.085 | .356** | 0.203 | 0.058 | 0.088 | .258* | -0.007 | 0.174 | 0.066 |
| | Sig. (2-tailed) | 0.031 | 0.086 | 0.454 | 0.001 | 0.073 | 0.612 | 0.443 | 0.022 | 0.949 | 0.126 | 0.566 |
| PrLM3 | Correlation Coefficient | 0.206 | 0.115 | 0.12 | 0.21 | 0.215 | 0.073 | 0.083 | 0.21 | -0.035 | 0.11 | 0.048 |
| | Sig. (2-tailed) | 0.068 | 0.313 | 0.294 | 0.063 | 0.057 | 0.52 | 0.469 | 0.063 | 0.759 | 0.333 | 0.674 |
| PrLM4 | Correlation Coefficient | 0.112 | 0.077 | 0.007 | 0.13 | 0.153 | -0.018 | 0.035 | 0.096 | -0.086 | 0.113 | 0.027 |
| | Sig. (2-tailed) | 0.325 | 0.498 | 0.952 | 0.255 | 0.179 | 0.873 | 0.757 | 0.401 | 0.452 | 0.321 | 0.812 |
| PrLM5 | Correlation Coefficient | .286* | 0.171 | 0.155 | .262* | 0.18 | -0.04 | 0.12 | 0.202 | -0.024 | 0.151 | 0.146 |
| | Sig. (2-tailed) | 0.011 | 0.132 | 0.172 | 0.02 | 0.112 | 0.729 | 0.293 | 0.074 | 0.831 | 0.184 | 0.199 |
| PoLM1 | Correlation Coefficient | 0.122 | 0.003 | -0.102 | 0.117 | 0.083 | 0.05 | 0.023 | 0.109 | 0.029 | 0.064 | 0.011 |
| | Sig. (2-tailed) | 0.284 | 0.977 | 0.37 | 0.306 | 0.465 | 0.663 | 0.841 | 0.34 | 0.799 | 0.576 | 0.921 |
| PoLM2 | Correlation Coefficient | 0.198 | 0.213 | 0.098 | 0.185 | .241* | 0.052 | 0.179 | 0.217 | -0.059 | 0.209 | 0.152 |
| | Sig. (2-tailed) | 0.081 | 0.06 | 0.39 | 0.102 | 0.032 | 0.652 | 0.115 | 0.055 | 0.605 | 0.065 | 0.18 |
| PoLM3 | Correlation Coefficient | 0.159 | .233* | -0.043 | 0.022 | 0.062 | -0.092 | -0.102 | 0.064 | -0.07 | 0.021 | -0.084 |
| | Sig. (2-tailed) | 0.163 | 0.039 | 0.704 | 0.844 | 0.586 | 0.42 | 0.372 | 0.577 | 0.54 | 0.851 | 0.464 |
| PoLM4 | Correlation Coefficient | 0.21 | .326** | 0.091 | 0.052 | 0.141 | -0.006 | -0.072 | 0.182 | 0.09 | 0.163 | 0.016 |
| | Sig. (2-tailed) | 0.063 | 0.003 | 0.426 | 0.65 | 0.214 | 0.958 | 0.528 | 0.108 | 0.429 | 0.15 | 0.887 |
| PoLM5 | Correlation Coefficient | 0.154 | .253* | -0.004 | 0.084 | 0.056 | -0.023 | -0.04 | 0.044 | -0.028 | 0.114 | -0.054 |
| | Sig. (2-tailed) | 0.175 | 0.024 | 0.972 | 0.463 | 0.621 | 0.843 | 0.724 | 0.703 | 0.803 | 0.319 | 0.639 |
| PoLM6 | Correlation Coefficient | 0.154 | .278* | 0.026 | 0.208 | 0.085 | -0.107 | -0.079 | 0.112 | -0.031 | 0.154 | 0.101 |
| | Sig. (2-tailed) | 0.175 | 0.013 | 0.823 | 0.065 | 0.455 | 0.348 | 0.487 | 0.324 | 0.788 | 0.176 | 0.373 |
| SLMN1 | Correlation Coefficient | 0.191 | .298** | 0.176 | .225* | .268* | 0.064 | 0.041 | .237* | 0.041 | .285* | 0.162 |
| | Sig. (2-tailed) | 0.091 | 0.008 | 0.12 | 0.046 | 0.017 | 0.578 | 0.719 | 0.036 | 0.718 | 0.011 | 0.154 |
| SLMN2 | Correlation Coefficient | .283* | .319** | 0.16 | .275* | 0.199 | 0.062 | 0.185 | .337** | 0.065 | .240* | 0.201 |
| | Sig. (2-tailed) | 0.011 | 0.004 | 0.159 | 0.014 | 0.078 | 0.587 | 0.102 | 0.002 | 0.572 | 0.033 | 0.076 |
| GCLM1 | Correlation Coefficient | -0.025 | 0.106 | -0.021 | 0.091 | -0.007 | -0.016 | -0.131 | -0.055 | -0.197 | 0.038 | -0.063 |
| | Sig. (2-tailed) | 0.826 | 0.355 | 0.851 | 0.426 | 0.951 | 0.891 | 0.25 | 0.628 | 0.082 | 0.737 | 0.58 |
| GCLM2 | Correlation Coefficient | 0.056 | 0.167 | -0.007 | 0.141 | 0.039 | 0.09 | -0.014 | 0.062 | -0.118 | 0.139 | 0.049 |
| | Sig. (2-tailed) | 0.622 | 0.142 | 0.948 | 0.215 | 0.733 | 0.43 | 0.904 | 0.584 | 0.3 | 0.221 | 0.669 |
| GCLM3 | Correlation Coefficient | .307** | .228* | .285* | .339** | .304** | 0.155 | 0.054 | 0.18 | 0.06 | 0.204 | 0.089 |
| | Sig. (2-tailed) | 0.006 | 0.043 | 0.011 | 0.002 | 0.006 | 0.172 | 0.639 | 0.113 | 0.6 | 0.071 | 0.435 |
| GCLM4 | Correlation Coefficient | .258* | .315** | .261* | .294** | .292** | 0.203 | 0.158 | 0.199 | 0.033 | .308** | 0.125 |
| | Sig. (2-tailed) | 0.022 | 0.005 | 0.02 | 0.008 | 0.009 | 0.072 | 0.166 | 0.078 | 0.775 | 0.006 | 0.273 |
| GCLM5 | Correlation Coefficient | .240* | .318** | 0.184 | .235* | 0.173 | 0.109 | 0.111 | .251* | -0.031 | .248* | 0.182 |
| | Sig. (2-tailed) | 0.033 | 0.004 | 0.105 | 0.037 | 0.127 | 0.341 | 0.331 | 0.026 | 0.789 | 0.027 | 0.108 |

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

There are 53 possible correlations between innovation performance measurements and innovation skills affected at both significant levels of 0.01 and 0.05. The correlation analysis exhibits no relationship of 5 performance variables with any of innovation skills variables, those variables are PrLM3, PrLM4, PoLM1, GCLM1, GCLM2. In addition, only 3 of innovation skills variables lacks correlation with any of performance measurements variables, those are DSSN1, DSSN2, ISSN2.

The highest positive correlation is captured between PrLM2 “Team members stay up-to-date of the most current knowledge within their field of work” and PSSN1 “teamwork” at the significant value of (0.001), which fall under the 1% level ($p < 0.01$) shown by ** next to the value.

Also, a significant correlation exhibited between GCLM3 “Diffusion of innovation strategy has added value, saved costs and generated new revenues across the government departments” and PSSN1 “Problem Solving”. Also between SLMN2 “Strategies match well with the way the market is evolving” and ISSN1 “Accountability”. Both reported as significant at the 1% level and actual value of (0.002).

In addition, PoLM4 “The suitability of the idea is checked against the indicators of success”, SLMN2 “Approaches exist to ensure ideas are aligned to strategy before implementation”, GCLM5 “Information about successful ideas is shared with other governments”, and GCLM4 “Projects and programs are related to the objectives and goals of the government strategy and achieve economic value on the national level” are correlated positively with KSSN2 “Idea Creation” at significant values of 1% (0.003, 0.004, 0.004, 0.005; respectively).

Moreover, there are other correlations obtained reported as significant at 1% level ($p<0.01$) shown by ** next to the value (blue color). While other several correlations reported as significant at the 5% level ($p>0.05$) shown by * next to the value (red color).

## 9.4. Correlation between Innovation Performance Measurements and Innovation Outcomes

Table 9.2 shows the correlation coefficient between innovation performance measurements and innovation outcomes. Unexpectedly, no much evidence of correlations observed between the two constructs; except one between SLMN2 and economic outcomes.

Table 9.2: Correlation Coefficient between Innovation Performance Measurements and Innovation Outcomes

**Correlations**

| Spearman's rho | | PLM | PrLM | PoLM | SLMN1 | SLMN2 | GCLM | Social | Economic | Public Service |
|---|---|---|---|---|---|---|---|---|---|---|
| PLM | Correlation Coefficient | 1 | .743** | .603** | .669** | .602** | .630** | 0.034 | 0.09 | -0.029 |
| | Sig. (2-tailed) | . | 0 | 0 | 0 | 0 | 0 | 0.769 | 0.431 | 0.8 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| PrLM | Correlation Coefficient | .743** | 1 | .685** | .692** | .646** | .684** | 0.054 | 0.193 | 0.038 |
| | Sig. (2-tailed) | 0 | . | 0 | 0 | 0 | 0 | 0.639 | 0.089 | 0.739 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| PoLM | Correlation Coefficient | .603** | .685** | 1 | .612** | .653** | .548** | -0.05 | 0.031 | -0.171 |
| | Sig. (2-tailed) | 0 | 0 | . | 0 | 0 | 0 | 0.662 | 0.783 | 0.131 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| SLMN1 | Correlation Coefficient | .669** | .692** | .612** | 1 | .682** | .726** | 0.016 | 0.169 | 0.046 |
| | Sig. (2-tailed) | 0 | 0 | 0 | . | 0 | 0 | 0.89 | 0.137 | 0.686 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| SLMN2 | Correlation Coefficient | .602** | .646** | .653** | .682** | 1 | .590** | 0.085 | .242* | 0.134 |
| | Sig. (2-tailed) | 0 | 0 | 0 | 0 | . | 0 | 0.454 | 0.031 | 0.239 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| GCLM | Correlation Coefficient | .630** | .684** | .548** | .726** | .590** | 1 | -0.024 | 0.066 | -0.056 |
| | Sig. (2-tailed) | 0 | 0 | 0 | 0 | 0 | . | 0.836 | 0.564 | 0.622 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Social | Correlation Coefficient | 0.034 | 0.054 | -0.05 | 0.016 | 0.085 | -0.024 | 1 | .677** | .740** |
| | Sig. (2-tailed) | 0.769 | 0.639 | 0.662 | 0.89 | 0.454 | 0.836 | . | 0 | 0 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Economic | Correlation Coefficient | 0.09 | 0.193 | 0.031 | 0.169 | .242* | 0.066 | .677** | 1 | .744** |
| | Sig. (2-tailed) | 0.431 | 0.089 | 0.783 | 0.137 | 0.031 | 0.564 | 0 | . | 0 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Public Service | Correlation Coefficient | -0.029 | 0.038 | -0.171 | 0.046 | 0.134 | -0.056 | .740** | .744** | 1 |
| | Sig. (2-tailed) | 0.8 | 0.739 | 0.131 | 0.686 | 0.239 | 0.622 | 0 | 0 | . |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Surprisingly, the result of the correlation has provided only 1 possible correlation between innovation performance measurements and innovation outcomes. This sole correlation exhibited between SLMN2 "Innovation Diffusion and Communication" and economic outcomes affected at a significant level of 0.05. The significant value for this correlation is (0.031), which fall under the 5% level ($p>0.05$) shown by * next to the value. This result means that the statistical analysis has not shown a relationship between performance level management and innovation outcomes.

## 9.5. Correlation between Innovation Skills and Innovation Outcomes

Table 9.3 shows the correlation coefficient between innovation skills and innovation outcomes. Significant correlations observed in the table explained in the following paragraph.

Table 9.3: Correlation Coefficient between Innovation Skills and Innovation Outcomes

**Correlations**

| Spearman's rho | | KSSN1 | KSSN2 | KSSN3 | PSSN1 | PSSN2 | DSSN1 | DSSN2 | ISSN1 | ISSN2 | SSSN1 | SSSN2 | Social | Economic | Public Service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KSSN1 | Correlation Coefficient | 1 | .412** | .591** | .562** | .645** | .382** | .568** | .558** | .366** | .429** | .363** | .396** | .520** | .434** |
| | Sig. (2-tailed) | . | 0 | 0 | 0 | 0 | 0.001 | 0 | 0 | 0.001 | 0 | 0.001 | 0 | 0 | 0 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| KSSN2 | Correlation Coefficient | .412** | 1 | .457** | .361** | .293** | .267* | .238* | .453** | .268* | .422** | .449** | .286* | 0.202 | .255* |
| | Sig. (2-tailed) | 0 | . | 0 | 0.001 | 0.009 | 0.017 | 0.035 | 0 | 0.017 | 0 | 0 | 0.011 | 0.074 | 0.023 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| KSSN3 | Correlation Coefficient | .591** | .457** | 1 | .517** | .581** | .252* | .475** | .479** | .381** | .356** | .395** | .385** | .368** | .397** |
| | Sig. (2-tailed) | 0 | 0 | . | 0 | 0 | 0.025 | 0 | 0 | 0.001 | 0.001 | 0 | 0 | 0.001 | 0 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| PSSN1 | Correlation Coefficient | .562** | .361** | .517** | 1 | .611** | .445** | .475** | .560** | .301** | .538** | .429** | .509** | .500** | .492** |
| | Sig. (2-tailed) | 0 | 0.001 | 0 | . | 0 | 0 | 0 | 0 | 0.007 | 0 | 0 | 0 | 0 | 0 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| PSSN2 | Correlation Coefficient | .645** | .293** | .581** | .611** | 1 | .408** | .440** | .552** | .324** | .536** | .313** | .409** | .444** | .357** |
| | Sig. (2-tailed) | 0 | 0.009 | 0 | 0 | . | 0 | 0 | 0 | 0.004 | 0 | 0.005 | 0 | 0 | 0.001 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| DSSN1 | Correlation Coefficient | .382** | .267* | .252* | .445** | .408** | 1 | .473** | .595** | .494** | .496** | .424** | .370** | .380** | .284* |
| | Sig. (2-tailed) | 0.001 | 0.017 | 0.025 | 0 | 0 | . | 0 | 0 | 0 | 0 | 0 | 0.001 | 0.001 | 0.011 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| DSSN2 | Correlation Coefficient | .568** | .238* | .475** | .475** | .440** | .473** | 1 | .608** | .484** | .395** | .439** | .416** | .443** | .341** |
| | Sig. (2-tailed) | 0 | 0.035 | 0 | 0 | 0 | 0 | . | 0 | 0 | 0 | 0 | 0 | 0 | 0.002 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| ISSN1 | Correlation Coefficient | .558** | .453** | .479** | .560** | .552** | .595** | .608** | 1 | .527** | .672** | .579** | .476** | .438** | .442** |
| | Sig. (2-tailed) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | . | 0 | 0 | 0 | 0 | 0 | 0 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| ISSN2 | Correlation Coefficient | .366** | .268* | .381** | .301** | .324** | .494** | .484** | .527** | 1 | .298** | .403** | .423** | .409** | .400** |
| | Sig. (2-tailed) | 0.001 | 0.017 | 0.001 | 0.007 | 0.004 | 0 | 0 | 0 | . | 0.008 | 0 | 0 | 0 | 0 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| SSSN1 | Correlation Coefficient | .429** | .422** | .356** | .538** | .536** | .496** | .395** | .672** | .298** | 1 | .560** | .463** | .423** | .341** |
| | Sig. (2-tailed) | 0 | 0 | 0.001 | 0 | 0 | 0 | 0 | 0 | 0.008 | . | 0 | 0 | 0 | 0.002 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| SSSN2 | Correlation Coefficient | .363** | .449** | .395** | .429** | .313** | .424** | .439** | .579** | .403** | .560** | 1 | .284* | .354** | .252* |
| | Sig. (2-tailed) | 0.001 | 0 | 0 | 0 | 0.005 | 0 | 0 | 0 | 0 | 0 | . | 0.011 | 0.001 | 0.025 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Social | Correlation Coefficient | .396** | .286* | .385** | .509** | .409** | .370** | .416** | .476** | .423** | .463** | .284* | 1 | .677** | .740** |
| | Sig. (2-tailed) | 0 | 0.011 | 0 | 0 | 0 | 0.001 | 0 | 0 | 0 | 0 | 0.011 | . | 0 | 0 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Economic | Correlation Coefficient | .520** | 0.202 | .368** | .500** | .444** | .380** | .443** | .438** | .409** | .423** | .354** | .677** | 1 | .744** |
| | Sig. (2-tailed) | 0 | 0.074 | 0.001 | 0 | 0 | 0.001 | 0 | 0 | 0 | 0 | 0.001 | 0 | . | 0 |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Public Service | Correlation Coefficient | .434** | .255* | .397** | .492** | .357** | .284* | .341** | .442** | .400** | .341** | .252* | .740** | .744** | 1 |
| | Sig. (2-tailed) | 0 | 0.023 | 0 | 0 | 0.001 | 0.011 | 0.002 | 0 | 0 | 0.002 | 0.025 | 0 | 0 | . |
| | N | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

There are 32 possible correlations between innovation skills and innovation outcomes affected at both significant levels of 0.01 and 0.05. The analyses show that there are positive correlations between all variables under the group of innovation skills and the three main innovation outcomes; social, economic, and public service. However, there is only one correlation which is less evidently exhibited between KSSN2 “Idea Creation” and economic outcome.

The highest positive association is captured between KSSN1 “Risk-Taking” and economic outcome at correlation coefficient value of (0.520), which fall under the 1% level ($p< 0.01$). Whereas, the lowest positive connection is captured between SSSN2 “Management Support’ and public service outcome. In general, KSSN2 and SSN2 had the lowest association with the three innovation outcomes. In addition, a significant correlation exhibited between PSSN1 “Problem Solving” and both social and economic outcomes at correlation coefficient values of (0.509 and 0.500 respectively), and a value of (0.492) with public service outcome. Moreover, there are other correlations obtained reported as significant at 1% level ($p<0.01$) shown by ** next to the value (blue color). While other several correlations reported as significant at the 5% level ($p>0.05$) shown by * next to the value (red color).

To summarize the results of correlations analyses, it is clearly noticed that the statistical analysis of approach tests has not proved a direct relationship between performance measurements and innovation outcomes. Whereas, it confirmed a significant correlation between innovation skills and innovation outcomes. The decisive partial correlations are captured between the performance measurement and innovation skills. Therefore, this results considerably suggest for the further investigation particularly on the role of mediator variable to establish more appropriate relationships of research main constructs. Exploration of the mediation relationship is carried out using the regression analyses.

## 9.6. Regression Analysis

The regression analyses will be based on the outcomes of correlation analyses. Therefore, Figure 9.5 showing the conceptual model which is developed to be the base for identifying relationships and making predictions between dependent and independent variables using regression tests. The presented conceptual model explains that innovation skills play the mediating role between the performance level measurement (independent variable) and innovation outcomes (dependent variable).

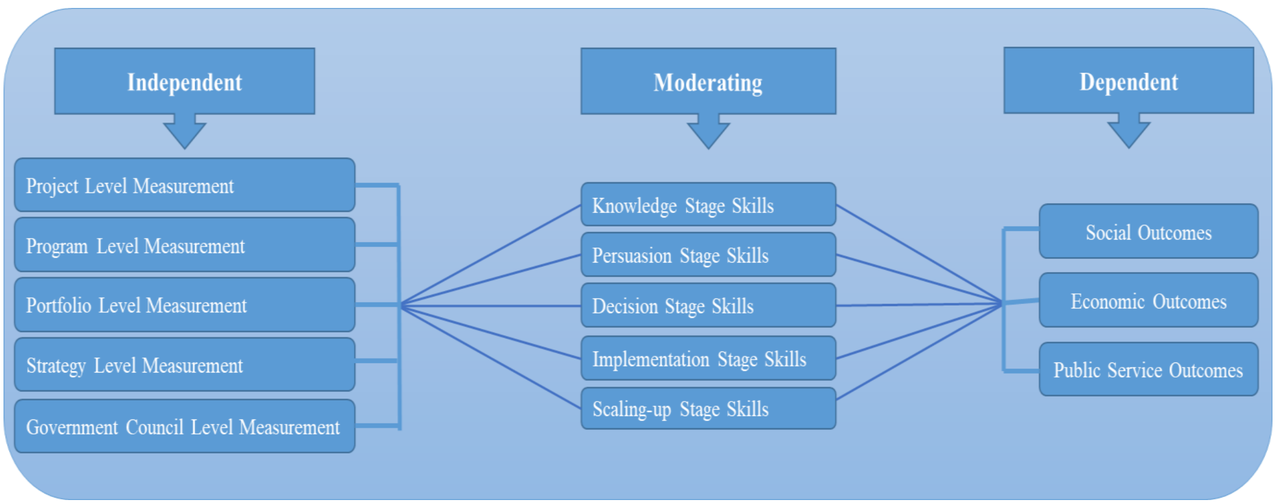



Figure 9.5: Regression Analyses

There are three main regression analyses to be applied to reveal the effect of performance measurement on the innovation outcomes (social, economic, public service) using one of those outcomes at a time. In the main regression analyses, there will be a cycle of performed test presented in subsections for each of performance levels (project, program, portfolio, strategy, government council). Therefore, the regression results are used to further test and support the assumptions made throughout this research paper and validating to what extent the results of the empirical study contributing to the research questions. Figure 5.6 shows the method that will be followed to test the multiple mediation effect of innovation skills on the relationship between performance measurement level and innovation outcomes.

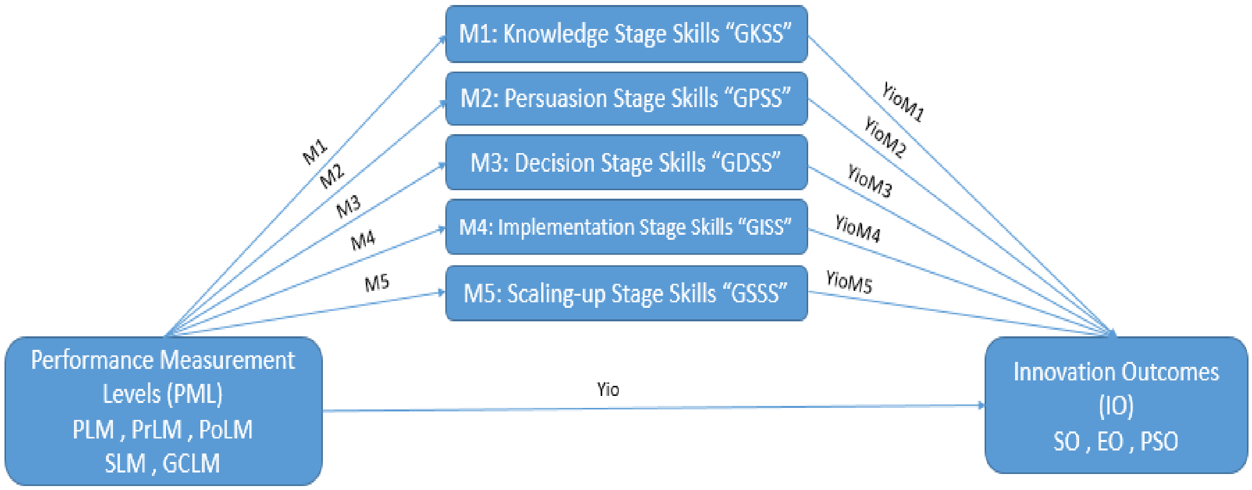



Figure 9.6: Mediation Analyses

The mediation process in Figure 9.6 capitalizes on a different stage of skills including knowledge, persuasion, decision, implementation, and scaling-up. The skills stages are developed from a consistent model method that bridge performance measurements to innovation outcomes. The model provides at least one mediated effect that performance measurements have a direct correlation to achieved innovation outcomes. Therefore, in testing mediation analyses the significance of relation of measurements (x variable) to outcomes (y variables) is vital for interpretation of achieved results. Thus in a public sector as mediating potentials from knowledge to scaling-up increase, the determining factors harmonized by "Yio" factors shows positive upgrading outcomes of the levels of public sector goods and services.

## 9.7. Modeling the impact of performance level measurements factors on the success of innovation outcomes

The target innovation undergoes cycles of regression analyses focusing on the impact of the performance of each identified level particularly on the success of innovation outcomes. The evaluation of the relationships will be on global factor level and it will take into consideration the mediation effect of the skills required at each stage of the innovation process to diffuse novelty strategy in the public sector. The analysis carried out was based on Baron and Kenny (1986) method of testing the mediation role. The authors suggest three regression equations that test the linkages of the meditational model, whereby, many researchers report their analysis projects relying on the methodology (Nese 2013; Leanne & Andrea 2017; Amanda & Samuel 2017).

Specifically the results of the mediator to independent model has been presented on social outcomes section only as the results and the figures of the regression are the same for economic and public server outcomes.

Appendix 4; provides detailed regression examination at factor level considering the inclusive analysis of current mediation relationship and including several tests; Model Summary, ANOVA, Coefficients, Collinearity Diagnostics, Residuals Statistics, Histogram of the Standardized Residuals, and Normal P-P Plot of Regression Standardized Residual.

### 9.7.1. Association between Project Level Measurements and Social Outcomes, mediated by Innovation Skills:

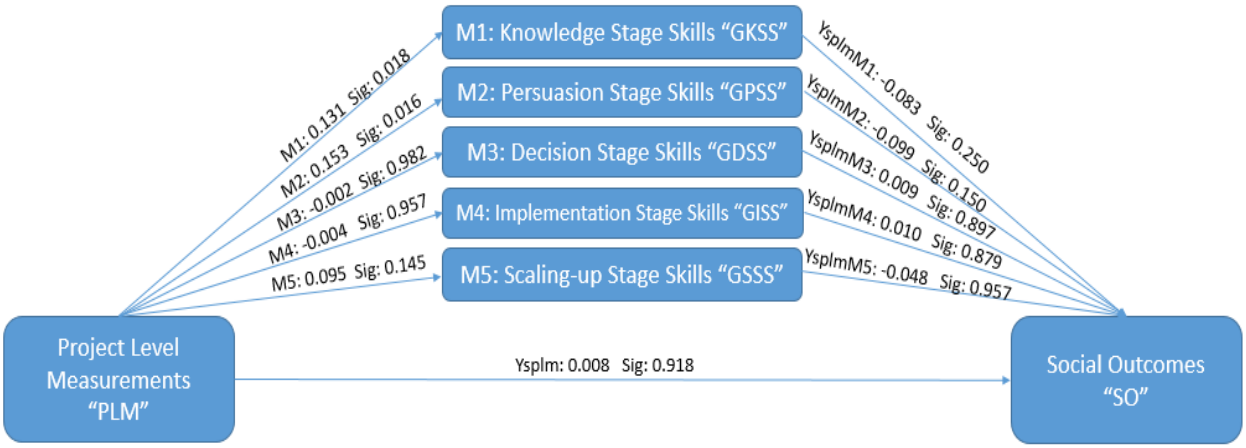



Figure 9.7.1: Mediation effect of IS on the relationship between PLM and SO

Figure 9.7.1 is the model summary derived by the multiple regression analysis between project level measurements and social outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between social outcomes and project level is shown by the following basic equation:

**Basic Model**

Ysplm = 4.381 + 0.008 PLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between project level and social outcomes is shown in the following mediator equations:

YsplmM1 = 1.785 – 0.083 PLM + 0.690 GKSS

YsplmM2 = 1.871 – 0.099 PLM + 0.698 GPSS

YsplmM3 = 2.053 + 0.009 PLM + 0.558 GDSS

YsplmM4 = 1.921 + 0.010 PLM + 0.595 GISS

YsplmM5 = 2.225 – 0.048 PLM + 0.585 GSSS

### Mediator to Independent

The relationship between innovation skills (mediator variable) and project level is shown in the following equations:

M1 (GKSS) = 3.760 + 0.131 PLM

M2 (GPSS) = 3.594 + 0.153 PLM

M3 (GDSS) = 4.175 - 0.002 PLM

M4 (GISS) = 4.138 - 0.004 PLM

M5 (GSSS) = 3.683 + 0.095 PLM

The results indicated that PLM accounted for the variance in the social outcome R2= -0.013, F= 0.011 and the PLM coefficient was significant, beta=0.008, p=0.918. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.289, F=16.862, and the mediator coefficient was significant at beta =0.698, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for PLM was decreased, except for M3 & M4 which slightly increased. The result of the mediator analysis are showing in table 9.7.1, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between PLM and Social Outcomes at p=0.000.

Table 9.7.1: Mediation results of PLM and Social Outcomes

| Model | R2 | F | Predictor | | Mediator | |
|---|---|---|---|---|---|---|
| | | | Beta | P | Beta | P |
| Ysplm | -0.013 | 0.011 | 0.008 | 0.918 | - | - |
| YsplmM1 | 0.212 | 11.471 | -0.083 | 0.250 | 0.690 | 0.000 |
| YsplmM2 | 0.289 | 16.862 | -0.099 | 0.150 | 0.698 | 0.000 |
| YsplmM3 | 0.212 | 11.469 | 0.009 | 0.897 | 0.558 | 0.000 |
| YsplmM4 | 0.245 | 13.649 | 0.010 | 0.879 | 0.595 | 0.000 |
| YsplmM5 | 0.217 | 11.802 | -0.048 | 0.494 | 0.585 | 0.000 |

### 9.7.2. Association between Program Level Measurements and Social Outcomes, mediated by Innovation Skills:

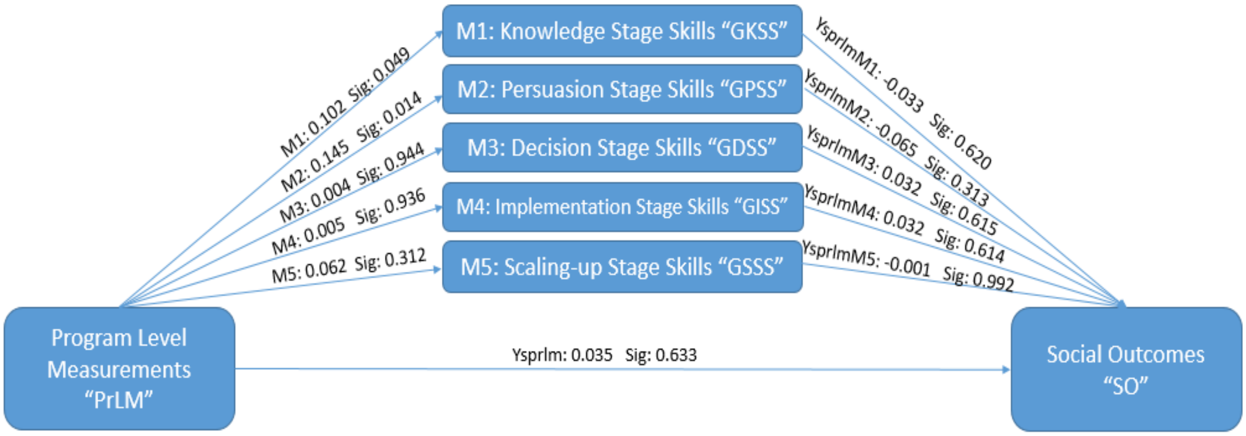



Figure 9.7.2: Mediation effect of IS on the relationship between PrLM and SO

Figure 9.7.2 is the model summary derived by the multiple regression analysis between program level measurements and social outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between social outcomes and program level is shown by the following basic equation:

**Basic Model**

Ysprlm = 4.294 + 0.035 PrLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between program level and social outcomes is shown in the following mediator equations:

YsprlmM1 = 1.717 – 0.033 PrLM + 0.662 GKSS

YsprlmM2 = 1.786 – 0.065 PrLM + 0.685 GPSS

YsprlmM3 = 1.980 + 0.032 PrLM + 0.557 GDSS

YsprlmM4 = 1.854 + 0.032 PrLM + 0.594 GISS

YsprlmM5 = 2.109 – 0.001 PrLM + 0.572 GSSS

**Mediator to Independent**

The relationship between innovation skills (mediator variable) and program level is shown in the following equations:

M1 (GKSS) = 3.894 + 0.102 PrLM

M2 (GPSS) = 3.661 + 0.145 PrLM

M3 (GDSS) = 4.155 + 0.004 PrLM

M4 (GISS) = 4.108 + 0.005 PrLM

M5 (GSSS) = 3.821 + 0.062 PrLM

The results indicated that PrLM accounted for the variance in the social outcome R2= -0.010, F= 0.230 and the PrLM coefficient was significant, beta=0.035, p=0.633. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.279, F=16.101, and the mediator coefficient was significant at beta =0.685, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for PrLM was decreased. The result of the mediator analysis are showing in table 9.7.2, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between PrLM and Social Outcomes at p=0.000.

Table 9.7.2: Mediation results of PrLM and Social Outcomes

| Model | R2 | F | Predictor | | Mediator | |
|---|---|---|---|---|---|---|
| | | | Beta | P | Beta | P |
| Ysprlm | -0.010 | 0.230 | 0.035 | 0.633 | - | - |
| YsprlmM1 | 0.200 | 10.772 | -0.033 | 0.620 | 0.662 | 0.000 |
| YsprlmM2 | 0.279 | 16.101 | -0.065 | 0.313 | 0.685 | 0.000 |
| YsprlmM3 | 0.234 | 11.624 | 0.032 | 0.615 | 0.557 | 0.000 |
| YsprlmM4 | 0.267 | 13.808 | 0.032 | 0.614 | 0.594 | 0.000 |
| YsprlmM5 | 0.232 | 11.495 | -0.001 | 0.992 | 0.572 | 0.000 |

### 9.7.3. Association between Portfolio Level Measurements and Social Outcomes, mediated by Innovation Skills:

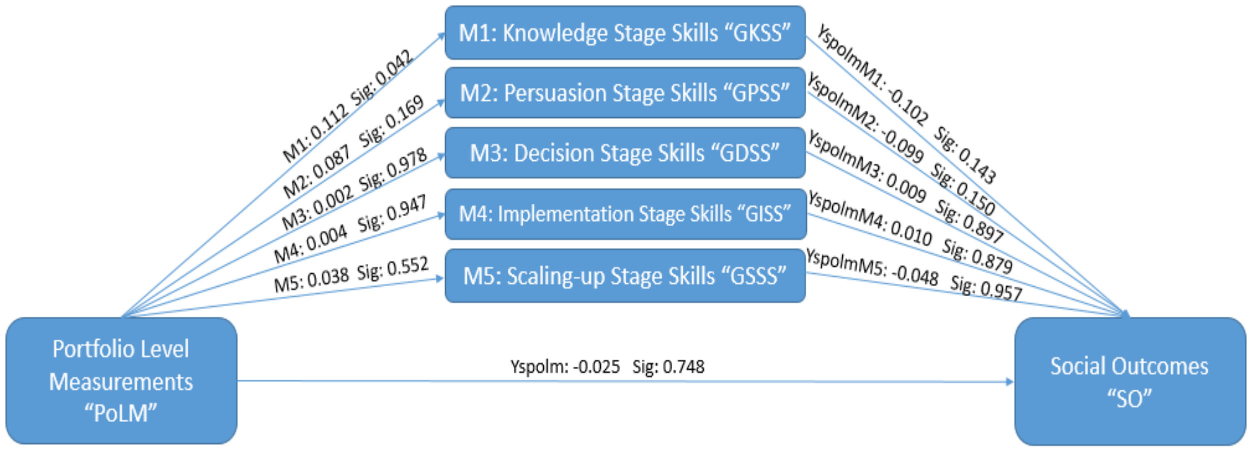



Figure 9.7.3: Mediation effect of IS on the relationship between PoLM and SO

Figure 9.7.3 is the model summary derived by the multiple regression analysis between portfolio level measurements and social outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between social outcomes and portfolio level is shown by the following basic equation:

**Basic Model**

Yspolm = 4.490 – 0.025 PoLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between portfolio level and social outcomes is shown in the following mediator equations:

YspolmM1 = 1.802 – 0.102 PoLM + 0.694 GKSS

YspolmM2 = 1.871 – 0.099 PoLM + 0.698 GPSS

YspolmM3 = 2.053 + 0.009 PoLM + 0.558 GDSS

YspolmM4 = 1.921 + 0.010 PoLM + 0.595 GISS

YspolmM5 = 2.225 – 0.048 PoLM + 0.585 GSSS

**Mediator to Independent**

The relationship between innovation skills (mediator variable) and portfolio level is shown in the following equations:

M1 (GKSS) = 3.873 + 0.112 PoLM

M2 (GPSS) = 3.865 + 0.087 PoLM

M3 (GDSS) = 4.164 + 0.002 PoLM

M4 (GISS) = 4.110 + 0.004 PoLM

M5 (GSSS) = 3.903 + 0.038 PoLM

The results indicated that PoLM accounted for the variance in the social outcome R2= -0.012, F= 0.104 and the PoLM coefficient was significant, beta=-0.025, p=0.748. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.285, F=16.520, and the mediator coefficient was significant at beta =0.674, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for PoLM was decreased. The result of the mediator analysis are showing in table 9.7.3, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between PoLM and Social Outcomes at p=0.000.

Table 9.7.3: Mediation results of PoLM and Social Outcomes

| Model | R2 | F | Predictor | | Mediator | |
|---|---|---|---|---|---|---|
| | | | Beta | P | Beta | P |
| Yspolm | -0.012 | 0.104 | -0.025 | 0.748 | - | - |
| YspolmM1 | 0.220 | 12.016 | -0.102 | 0.143 | 0.694 | 0.000 |
| YspolmM2 | 0.285 | 16.520 | -0.083 | 0.206 | 0.674 | 0.000 |
| YspolmM3 | 0.213 | 11.552 | -0.026 | 0.704 | 0.558 | 0.000 |
| YspolmM4 | 0.246 | 13.750 | -0.027 | 0.680 | 0.595 | 0.000 |
| YspolmM5 | 0.217 | 11.810 | -0.047 | 0.489 | 0.577 | 0.000 |

### 9.7.4. Association between Strategy Level Measurements and Social Outcomes, mediated by Innovation Skills:

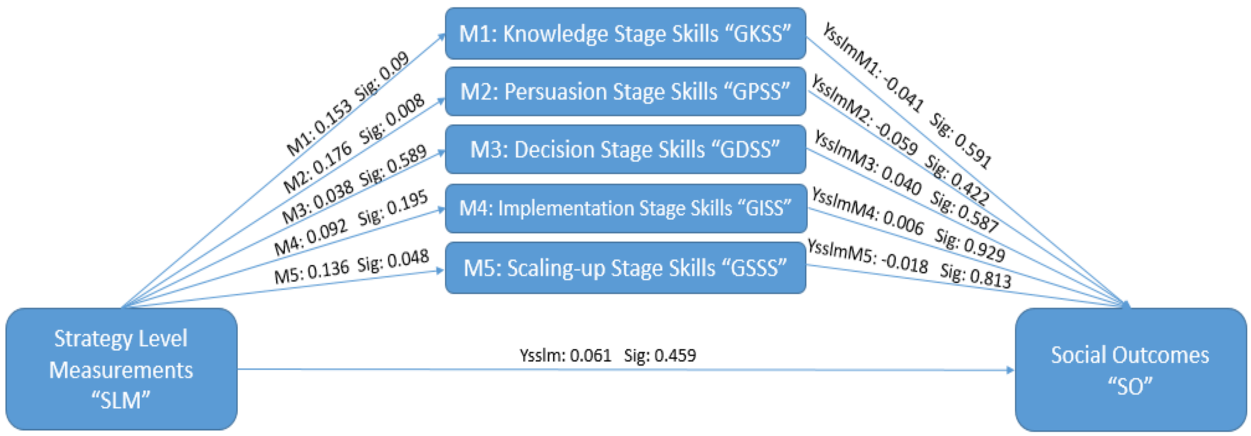



Figure 9.7.4: Mediation effect of IS on the relationship between SLM and SO

Figure 9.7.4 is the model summary derived by the multiple regression analysis between strategy level measurements and social outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between social outcomes and strategy level is shown by the following basic equation:

**Basic Model**

Ysslm = 4.205 + 0.061 SLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between strategy level and social outcomes is shown in the following mediator equations:

YsslmM1 = 1.715 – 0.041 SLM + 0.669 GKSS

YsslmM2 = 1.787 – 0.059 SLM + 0.680 GPSS

YsslmM3 = 1.969 + 0.040 SLM + 0.554 GDSS

YsslmM4 = 1.943 + 0.006 SLM + 0.593 GISS

YsslmM5 = 2.141 – 0.018 SLM + 0.578 GSSS

**Mediator to Independent**

The relationship between innovation skills (mediator variable) and strategy level is shown in the following equations:

M1 (GKSS) = 3.723 + 0.153 SLM

M2 (GPSS) = 3.555 + 0.176 SLM

M3 (GDSS) = 4.041 + 0.038 SLM

M4 (GISS) = 3.816 + 0.092 SLM

M5 (GSSS) = 3.571 + 0.136 SLM

The results indicated that SLM accounted for the variance in the social outcome R2= -0.006, F= 0.553 and the SLM coefficient was significant, beta=0.061, p=0.459. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.276, F=15.835, and the mediator coefficient was significant at beta =0.680, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for SLM was decreased. The result of the mediator analysis are showing in table 9.7.4, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between SLM and Social Outcomes at p=0.000.

Table 9.7.4: Mediation results of SLM and Social Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Ysslm | -0.006 | 0.553 | 0.061 | 0.459 | - | - |
| YsslmM1 | 0.201 | 10.799 | -0.041 | 0.591 | 0.669 | 0.000 |
| YsslmM2 | 0.276 | 15.835 | -0.059 | 0.422 | 0.680 | 0.000 |
| YsslmM3 | 0.215 | 11.652 | 0.040 | 0.587 | 0.554 | 0.000 |
| YsslmM4 | 0.245 | 13.639 | 0.006 | 0.929 | 0.593 | 0.000 |
| YsslmM5 | 0.213 | 11.531 | -0.018 | 0.813 | 0.578 | 0.000 |

### 9.7.5. Association between Government Council Level Measurements and Social Outcomes, mediated by Innovation Skills:

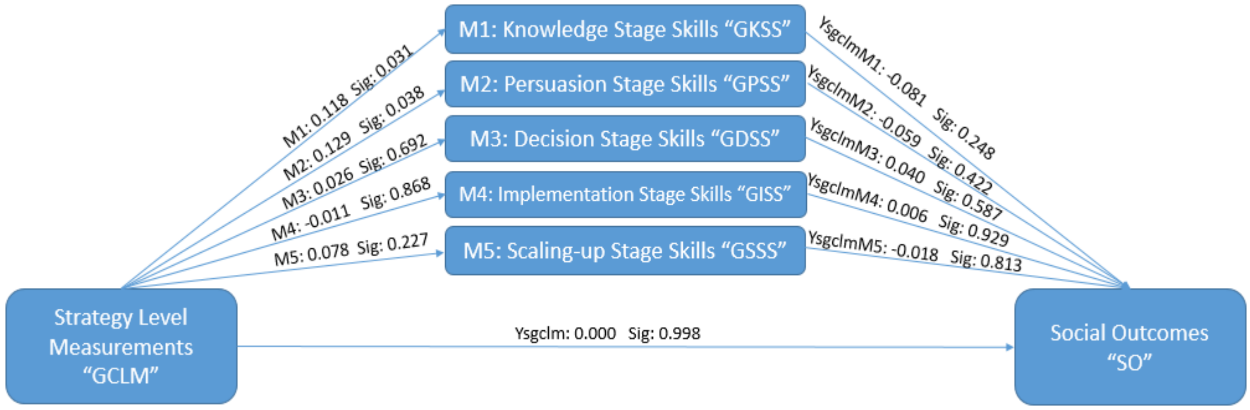



Figure 9.7.5: Mediation effect of IS on the relationship between GCLM and SO

Figure 9.7.5 is the model summary derived by the multiple regression analysis between government council level measurements and social outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between social outcomes and government council level is shown by the following basic equation:

**Basic Model**

Ysgclm = 4.410 + 0.000 GCLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between government council level and social outcomes is shown in the following mediator equations:

YsgclmM1 = 1.794 – 0.081 GCLM + 0.686 GKSS

YsgclmM2 = 1.787 – 0.059 GCLM + 0.680 GPSS

YsgclmM3 = 1.969 + 0.040 GCLM + 0.554 GDSS

YsgclmM4 = 1.943 + 0.006 GCLM + 0.593 GISS

YsgclmM5 = 2.141 – 0.018 GCLM + 0.578 GSSS

**Mediator to Independent**

The relationship between innovation skills (mediator variable) and government council level is shown in the following equations:

M1 (GKSS) = 3.811 + 0.118 GCLM

M2 (GPSS) = 3.682 + 0.129 GCLM

M3 (GDSS) = 4.076 + 0.026 GCLM

M4 (GISS) = 4.164 – 0.011 GCLM

M5 (GSSS) = 3.748 + 0.078 GCLM

The results indicated that GCLM accounted for the variance in the social outcome R2= -0.013, F= 0.000 and the GCLM coefficient was significant, beta=0.000, p=0.998. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.286, F=16.645, and the mediator coefficient was significant at beta =0.688, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for GCLM was decreased. The result of the mediator analysis are showing in table 9.7.5, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between GCLM and Social Outcomes at p=0.000.

Table 9.7.5: Mediation results of GCLM and Social Outcomes

| Model | R2 | F | Predictor | | Mediator | |
|---|---|---|---|---|---|---|
| | | | Beta | P | Beta | P |
| Ysgclm | -0.013 | 0.000 | 0.000 | 0.998 | - | - |
| YsgclmM1 | 0.212 | 11.480 | -0.081 | 0.248 | 0.686 | 0.000 |
| YsgclmM2 | 0.286 | 16.645 | -0.089 | 0.183 | 0.688 | 0.000 |
| YsgclmM3 | 0.232 | 11.488 | -0.015 | 0.831 | 0.559 | 0.000 |
| YsgclmM4 | 0.264 | 13.640 | 0.007 | 0.920 | 0.595 | 0.000 |
| YsgclmM5 | 0.217 | 11.783 | -0.045 | 0.508 | 0.583 | 0.000 |

### 9.7.6. Association between Project Level Measurements and Economic Outcomes, mediated by Innovation Skills:

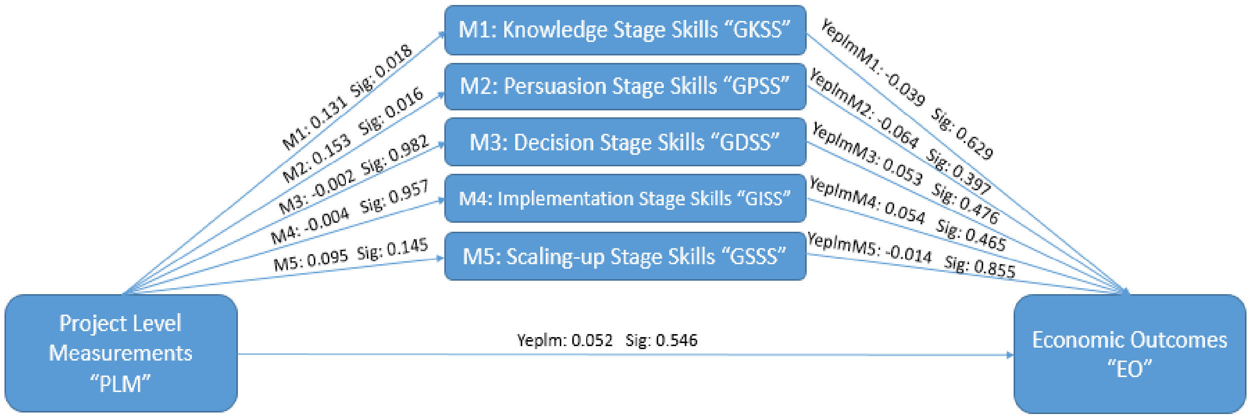



Figure 9.7.6: Mediation effect of IS on the relationship between PLM and EO

Figure 9.7.6 is the model summary derived by the multiple regression analysis between project level measurements and economic outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between economic outcomes and project level is shown by the following basic equation:

**Basic Model**

Yeplm = 4.173 + 0.052 PLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between project level and economic outcomes is shown in the following mediator equations:

YeplmM1 = 1.571 – 0.039 PLM + 0.692 GKSS

YeplmM2 = 1.449 – 0.064 PLM + 0.758 GPSS

YeplmM3 = 1.423 + 0.053 PLM + 0.659 GDSS

YeplmM4 = 1.456 + 0.054 PLM + 0.657 GISS

YeplmM5 = 1.641 – 0.014 PLM + 0.688 GSSS

The results indicated that PLM accounted for the variance in the economic outcome R2= -0.008, F= 0.367 and the PLM coefficient was significant, beta=0.052, p=0.546. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.284, F=16.496, and the mediator coefficient was significant at beta =0.758, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for PLM was decreased, except for M3 & M4 which slightly increased. The result of the mediator analysis are showing in table 9.7.6, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between PLM and Economic Outcomes at p=0.000.

Table 9.7.6: Mediation results of PLM and Economic Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Yeplm | -0.008 | 0.367 | 0.052 | 0.546 | - | - |
| YeplmM1 | 0.175 | 9.290 | -0.039 | 0.629 | 0.692 | 0.000 |
| YeplmM2 | 0.284 | 16.496 | -0.064 | 0.397 | 0.758 | 0.000 |
| YeplmM3 | 0.252 | 14.117 | 0.053 | 0.476 | 0.659 | 0.000 |
| YeplmM4 | 0.251 | 14.042 | 0.054 | 0.465 | 0.657 | 0.000 |
| YeplmM5 | 0.255 | 14.318 | -0.014 | 0.855 | 0.688 | 0.000 |

### 9.7.7. Association between Program Level Measurements and Economic Outcomes, mediated by Innovation Skills:

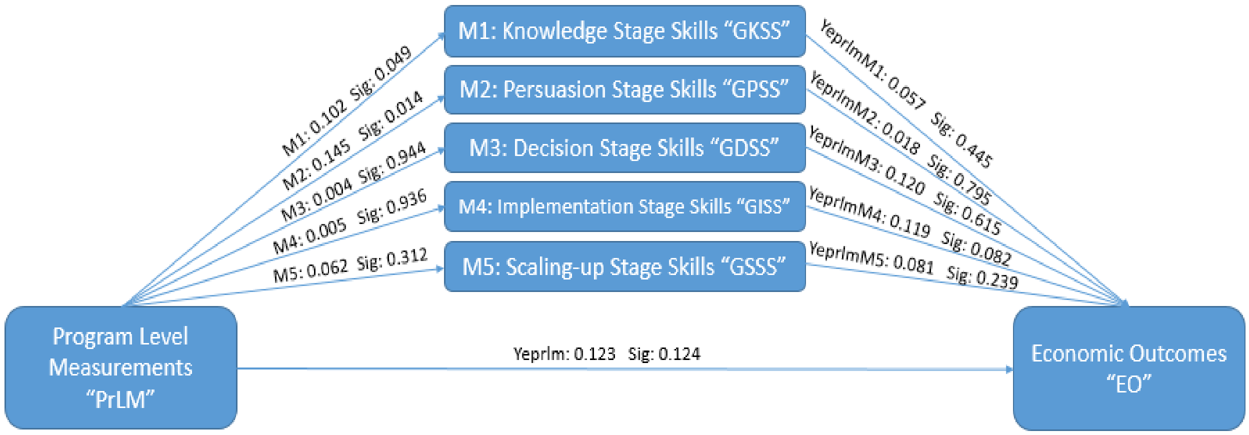



Figure 9.7.7: Mediation effect of IS on the relationship between PrLM and EO

Figure 9.7.7 is the model summary derived by the multiple regression analysis between program level measurements and economic outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between economic outcomes and program level is shown by the following basic equation:

**Basic Model**

Yeprlm = 3.952 + 0.123 PrLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between program level and economic outcomes is shown in the following mediator equations:

YeprlmM1 = 1.445 + 0.057 PrLM + 0.644 GKSS

YeprlmM2 = 1.324 + 0.018 PrLM + 0.718 GPSS

YeprlmM3 = 1.223 + 0.120 PrLM + 0.657 GDSS

YeprlmM4 = 1.265 + 0.119 PrLM + 0.654 GISS

YeprlmM5 = 1.406 + 0.081 PrLM + 0.666 GSSS

The results indicated that PrLM accounted for the variance in the economic outcome R2= 0.018, F= 2.418 and the PrLM coefficient was significant, beta=0.123, p=0.124. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.278, F=16.028, and the mediator coefficient was significant at beta =0.795, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for PrLM was decreased. The result of the mediator analysis are showing in table 9.7.7, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between PrLM and Economic Outcomes at p=0.000.

Table 9.7.7: Mediation results of PrLM and Economic Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Yeprlm | 0.018 | 2.418 | 0.123 | 0.124 | - | - |
| YeprlmM1 | 0.179 | 9.509 | 0.057 | 0.445 | 0.644 | 0.000 |
| YeprlmM2 | 0.278 | 16.028 | 0.018 | 0.795 | 0.718 | 0.000 |
| YeprlmM3 | 0.276 | 15.898 | 0.120 | 0.081 | 0.657 | 0.000 |
| YeprlmM4 | 0.275 | 15.783 | 0.119 | 0.082 | 0.654 | 0.000 |
| YeprlmM5 | 0.287 | 15.264 | -0.081 | 0.239 | 0.666 | 0.000 |

### 9.7.8. Association between Portfolio Level Measurements and Economic Outcomes, mediated by Innovation Skills:

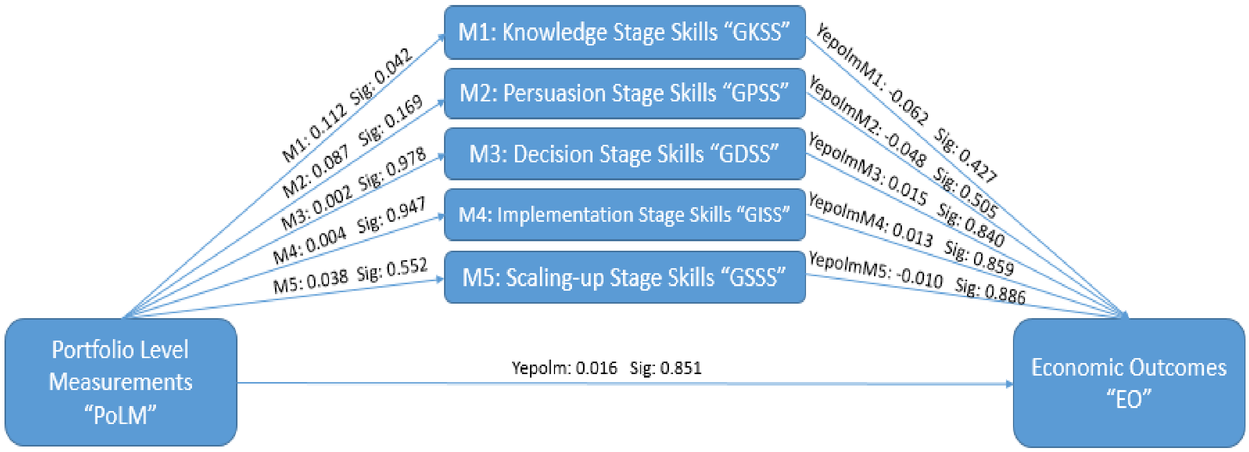



Figure 9.7.8: Mediation effect of IS on the relationship between PoLM and EO

Figure 9.7.8 is the model summary derived by the multiple regression analysis between portfolio level measurements and economic outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between economic outcomes and portfolio level is shown by the following basic equation:

**Basic Model**

Yepolm = 4.309 – 0.016 PoLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between portfolio level and economic outcomes is shown in the following mediator equations:

YepolmM1 = 1.596 – 0.062 PoLM + 0.700 GKSS

YepolmM2 = 1.445 – 0.048 PoLM + 0.741 GPSS

YepolmM3 = 1.568 + 0.015 PoLM + 0.658 GDSS

YepolmM4 = 1.613 + 0.013 PoLM + 0.656 GISS

YepolmM5 = 1.636 – 0.010 PoLM + 0.685 GSSS

The results indicated that PoLM accounted for the variance in the economic outcome R2= -0.013, F= 0.013 and the PoLM coefficient was significant, beta=-0.016, p=0.851. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.282, F=16.299, and the mediator coefficient was significant at beta =0.741, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for PoLM was decreased. The result of the mediator analysis are showing in table 9.7.8, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between PoLM and Economic Outcomes at p=0.000.

Table 9.7.8: Mediation results of PoLM and Economic Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Yepolm | -0.013 | 0.036 | 0.016 | 0.851 | - | - |
| YepolmM1 | 0.180 | 9.539 | -0.062 | 0.427 | 0.700 | 0.000 |
| YepolmM2 | 0.282 | 16.299 | -0.048 | 0.505 | 0.741 | 0.000 |
| YepolmM3 | 0.247 | 13.795 | 0.015 | 0.840 | 0.658 | 0.000 |
| YepolmM4 | 0.246 | 13.697 | 0.013 | 0.859 | 0.656 | 0.000 |
| YepolmM5 | 0.254 | 14.309 | -0.010 | 0.886 | 0.685 | 0.000 |

### 9.7.9. Association between Strategy Level Measurements and Economic Outcomes, mediated by Innovation Skills:

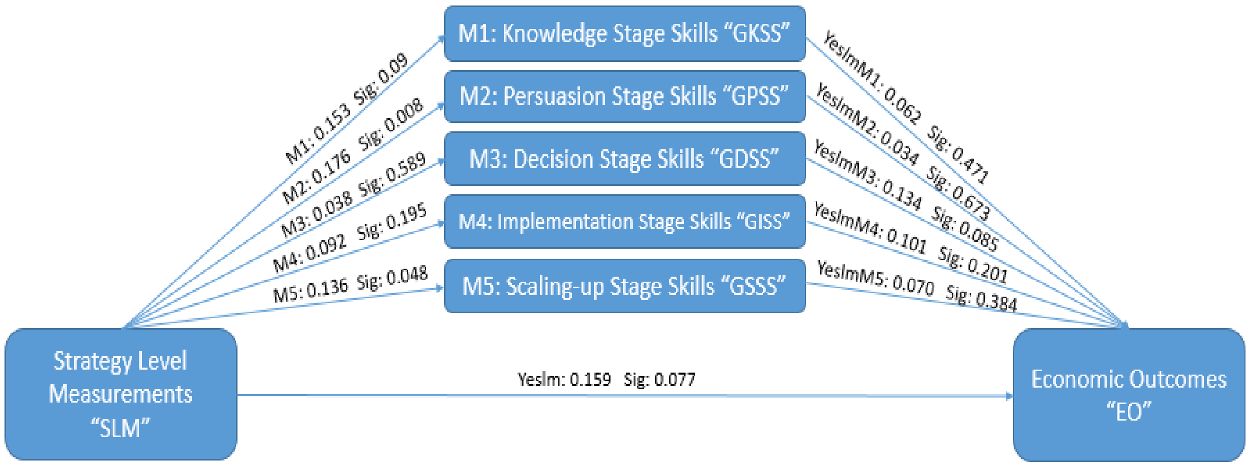



Figure 9.7.9: Mediation effect of IS on the relationship between SLM and EO

Figure 9.7.9 is the model summary derived by the multiple regression analysis between strategy level measurements and economic outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between economic outcomes and strategy level is shown by the following basic equation:

**Basic Model**

Yeslm = 3.827 + 0.159 SLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between strategy level and economic outcomes is shown in the following mediator equations:

YeslmM1 = 1.458 + 0.062 SLM + 0.636 GKSS

YeslmM2 = 1.301 + 0.034 SLM + 0.710 GPSS

YeslmM3 = 1.220 + 0.134 SLM + 0.645 GDSS

YeslmM4 = 1.414 + 0.101 SLM + 0.632 GISS

YeslmM5 = 1.476 + 0.070 SLM + 0.658 GSSS

The results indicated that SLM accounted for the variance in the economic outcome R2= 0.028, F= 3.207 and the SLM coefficient was significant, beta=0.159, p=0.077. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.279, F=16.107, and the mediator coefficient was significant at beta =0.637, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for SLM was decreased. The result of the mediator analysis are showing in table 9.7.9, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between SLM and Economic Outcomes at p=0.000.

Table 9.7.9: Mediation results of SLM and Economic Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Yeslm | 0.028 | 3.207 | 0.159 | 0.077 | - | - |
| YeslmM1 | 0.178 | 9.470 | 0.062 | 0.471 | 0.636 | 0.000 |
| YeslmM2 | 0.279 | 16.107 | 0.034 | 0.673 | 0.710 | 0.000 |
| YeslmM3 | 0.276 | 15.848 | 0.134 | 0.085 | 0.645 | 0.000 |
| YeslmM4 | 0.261 | 14.806 | 0.101 | 0.201 | 0.632 | 0.000 |
| YeslmM5 | 0.262 | 14.823 | 0.070 | 0.384 | 0.658 | 0.000 |

### 9.7.10. Association between Government Council Level Measurements and Economic Outcomes, mediated by Innovation Skills:

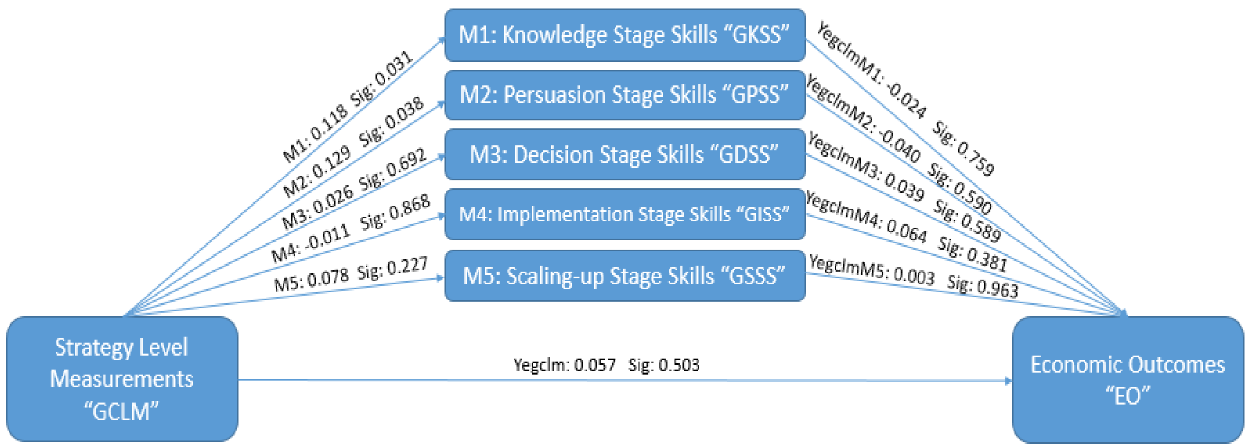



Figure 9.7.10: Mediation effect of IS on the relationship between GCLM and EO

Figure 9.7.10 is the model summary derived by the multiple regression analysis between government council level measurements and economic outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between economic outcomes and government council level is shown by the following basic equation:

**Basic Model**

Yegclm = 4.157 + 0.057 GCLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between government council level and economic outcomes is shown in the following mediator equations:

YegclmM1 = 1.554 – 0.024 GCLM + 0.683 GKSS

YegclmM2 = 1.418 – 0.040 GCLM + 0.744 GPSS

YegclmM3 = 1.487 + 0.039 GCLM + 0.655 GDSS

YegclmM4 = 1.417 + 0.064 GCLM + 0.658 GISS

YegclmM5 = 1.598 + 0.003 GCLM + 0.683 GSSS

The results indicated that GCLM accounted for the variance in the economic outcome R2= -0.007, F= 0.453 and the GCLM coefficient was significant, beta=0.057, p=0.503. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.280, F=16.187, and the mediator coefficient was significant at beta =0.683, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for GCLM was decreased. The result of the mediator analysis are showing in table 9.7.10, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between GCLM and Economic Outcomes at p=0.000.

Table 9.7.10: Mediation results of GCLM and Economic Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Yegclm | -0.007 | 0.453 | 0.057 | 0.503 | - | - |
| YegclmM1 | 0.174 | 9.202 | -0.024 | 0.759 | 0.683 | 0.000 |
| YegclmM2 | 0.280 | 16.187 | -0.040 | 0.590 | 0.744 | 0.000 |
| YegclmM3 | 0.250 | 13.968 | 0.039 | 0.589 | 0.655 | 0.000 |
| YegclmM4 | 0.253 | 14.203 | 0.064 | 0.381 | 0.658 | 0.000 |
| YegclmM5 | 0.254 | 14.296 | 0.003 | 0.963 | 0.683 | 0.000 |

### 9.7.11. Association between Project Level Measurements and Public Service Outcomes, mediated by Innovation Skills:


Figure 9.7.11: Mediation effect of IS on the relationship between PLM and PSO

Figure 9.7.11 is the model summary derived by the multiple regression analysis between project level measurements and public service outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between public service outcomes and project level is shown by the following basic equation:

**Basic Model**

Ypsplm = 4.511 - 0.016 PLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between project level and public service outcomes is shown in the following mediator equations:

YpsplmM1 = 1.982 – 0.105 PLM + 0.690 GKSS

YpsplmM2 = 2.176 – 0.116 PLM + 0.650 GPSS

YpsplmM3 = 2.596 – 0.016 PLM + 0.459 GDSS

YpsplmM4 = 2.223 - 0.014 PLM + 0.553 GISS

YpsplmM5 = 2.550 – 0.067 PLM + 0.533 GSSS

The results indicated that PLM accounted for the variance in the public service outcome R2= -0.012, F= 0.040 and the PLM coefficient was significant, beta=-0.016, p=0.841. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.220, F=11.984, and the mediator coefficient was significant at beta =0.560, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for PLM was decreased. The result of the mediator analysis are showing in table 9.7.11, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between PLM and Public Service Outcomes at p=0.000.

Table 9.7.11: Mediation results of PLM and Public Service Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Ypsplm | -0.012 | 0.040 | -0.016 | 0.841 | - | - |
| YpsplmM1 | 0.177 | 9.412 | -0.105 | 0.176 | 0.673 | 0.000 |
| YpsplmM2 | 0.220 | 11.984 | -0.116 | 0.126 | 0.560 | 0.000 |
| YpsplmM3 | 0.119 | 6.271 | -0.016 | 0.837 | 0.459 | 0.000 |
| YpsplmM4 | 0.185 | 9.864 | -0.014 | 0.845 | 0.553 | 0.000 |
| YpsplmM5 | 0.155 | 8.164 | -0.067 | 0.379 | 0.533 | 0.000 |

### 9.7.12. Association between Program Level Measurements and Public Service Outcomes, mediated by Innovation Skills:

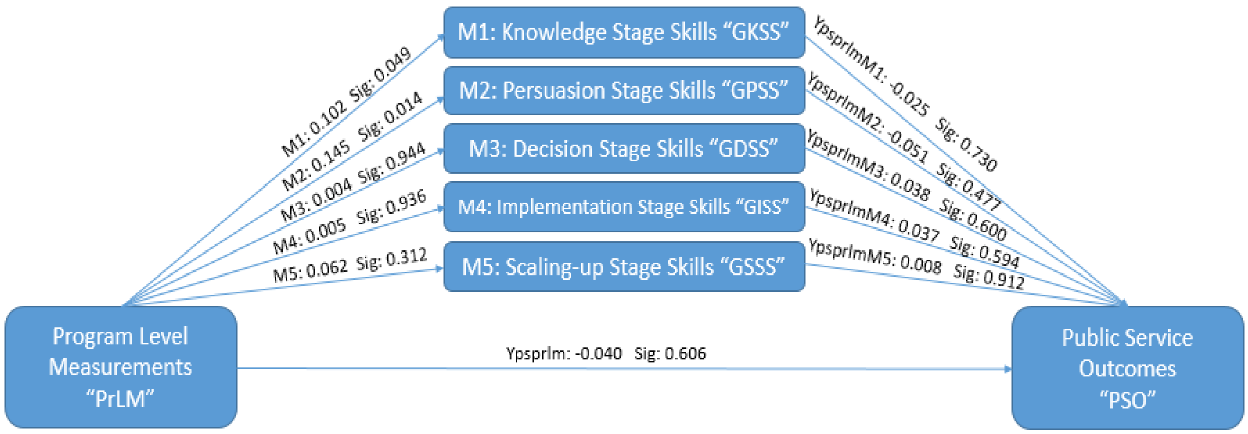



Figure 9.7.12: Mediation effect of IS on the relationship between PrLM and PSO

Figure 9.7.12 is the model summary derived by the multiple regression analysis between program level measurements and public service outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between public service outcomes and program level is shown by the following basic equation:

**Basic Model**

Ypsprlm = 4.320 + 0.040 PrLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between program level and public service outcomes is shown in the following mediator equations:

YpsprlmM1 = 1.873 – 0.025 PrLM + 0.628 GKSS

YpsprlmM2 = 2.047 – 0.051 PrLM + 0.621 GPSS

YpsprlmM3 = 2.415 + 0.038 PrLM + 0.458 GDSS

YpsprlmM4 = 2.050 + 0.037 PrLM + 0.553 GISS

YpsprlmM5 = 2.365 + 0.008 PrLM + 0.512 GSSS

The results indicated that PrLM accounted for the variance in the public service outcome $R2= -0.009$, $F= 0.268$ and the PrLM coefficient was significant, beta=-0.040, p=0.606. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with $R2=0.201$, $F=10.786$, and the mediator coefficient was significant at beta =0.621, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for PrLM was decreased. The result of the mediator analysis are showing in table 9.7.12, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between PrLM and Public Service Outcomes at p=0.000.

Table 9.7.12: Mediation results of PrLM and Public Service Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Ypsprlm | -o.oo9 | 0.268 | 0.040 | 0.606 | - | - |
| YpsprlmM1 | 0.159 | 8.348 | -0.25 | 0.730 | 0.628 | 0.000 |
| YpsprlmM2 | 0.201 | 10.786 | -0.51 | 0.477 | 0.621 | 0.000 |
| YpsprlmM3 | 0.122 | 6.407 | 0.038 | 0.600 | 0.458 | 0.000 |
| YpsprlmM4 | 0.188 | 10.020 | 0.037 | 0.594 | 0.553 | 0.000 |
| YpsprlmM5 | 0.147 | 7.701 | 0.008 | 0.912 | 0.512 | 0.000 |

### 9.7.13. Association between Portfolio Level Measurements and Public Service Outcomes, mediated by Innovation Skills:

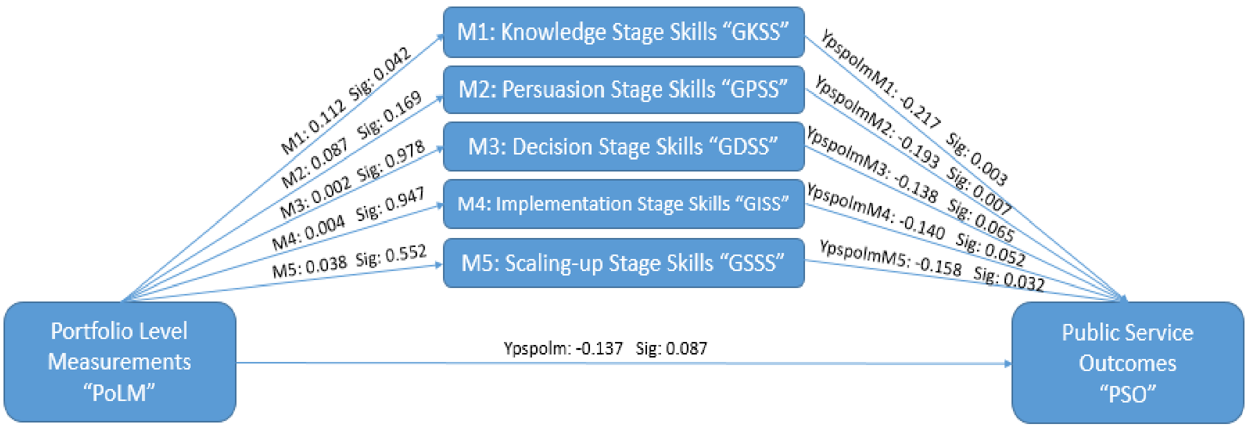



Figure 9.7.13: Mediation effect of IS on the relationship between PoLM and PSO

Figure 9.7.13 is the model summary derived by the multiple regression analysis between portfolio level measurements and public service outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between public service outcomes and portfolio level is shown by the following basic equation:

**Basic Model**

Ypspolm = 4.897 – 0.137 PoLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between portfolio level and public service outcomes is shown in the following mediator equations:

YpspolmM1 = 2.112 – 0.217 PoLM + 0.719 GKSS

YpspolmM2 = 2.390 – 0.193 PoLM + 0.649 GPSS

YpspolmM3 = 2.984 – 0.138 PoLM + 0.460 GDSS

YpspolmM4 = 2.616 – 0.140 PoLM + 0.555 GISS

YpspolmM5 = 2.820 – 0.158 PoLM + 0.532 GSSS

The results indicated that PoLM accounted for the variance in the public service outcome R2= 0.025, F= 3.003 and the PoLM coefficient was significant, beta=-0.137, p=0.087. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.270, F=15.413, and the mediator coefficient was significant at beta =0.0649, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for PoLM was decreased. The result of the mediator analysis are showing in table 9.7.13, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between PoLM and Public Service Outcomes at p=0.000.

Table 9.7.13: Mediation results of PoLM and Public Service Outcomes

| Model | R2 | F | Predictor | | Mediator | |
|---|---|---|---|---|---|---|
| | | | Beta | P | Beta | P |
| Ypspolm | 0.025 | 3.003 | -0.137 | 0.087 | - | - |
| YpspolmM1 | 0.249 | 13.925 | -0.217 | 0.003 | 0.719 | 0.000 |
| YpspolmM2 | 0.270 | 15.413 | -0.193 | 0.007 | 0.649 | 0.000 |
| YpspolmM3 | 0.158 | 8.294 | -0.138 | 0.065 | 0.460 | 0.000 |
| YpspolmM4 | 0.225 | 12.302 | -0.140 | 0.052 | 0.555 | 0.000 |
| YpspolmM5 | 0.197 | 10.575 | -0.158 | 0.032 | 0.532 | 0.000 |

### 9.7.14. Association between Strategy Level Measurements and Public Service Outcomes, mediated by Innovation Skills:

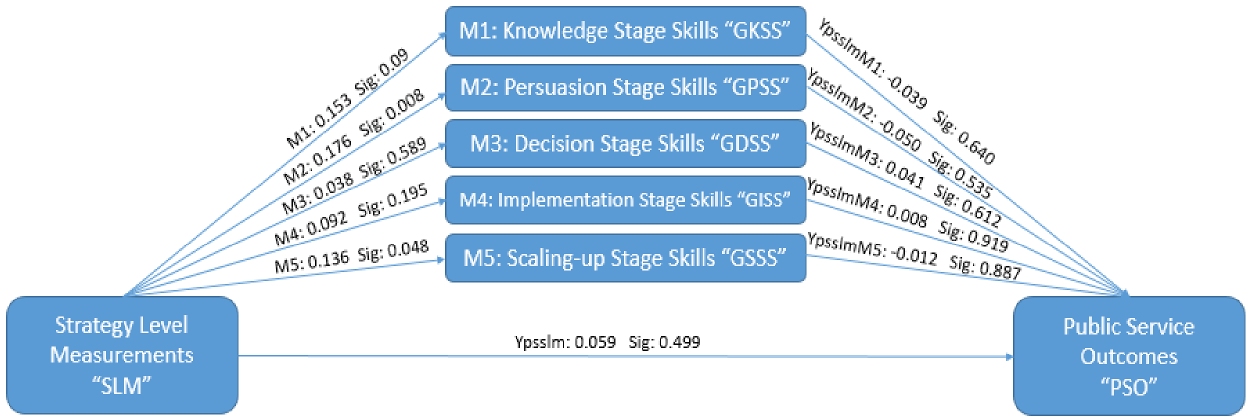



Figure 9.7.14: Mediation effect of IS on the relationship between SLM and PSO

Figure 9.7.14 is the model summary derived by the multiple regression analysis between strategy level measurements and public service outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between public service outcomes and strategy level is shown by the following basic equation:

**Basic Model**

Ypsslm = 4.254 + 0.059 SLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between strategy level and public service outcomes is shown in the following mediator equations:

YpsslmM1 = 1.879 – 0.039 SLM + 0.638 GKSS

YpsslmM2 = 2.053 – 0.050 SLM + 0.619 GPSS

YpsslmM3 = 2.417 + 0.041 SLM + 0.455 GDSS

YpsslmM4 = 2.151 + 0.008 SLM + 0.551 GISS

YpsslmM5 = 2.406 – 0.012 SLM + 0.518 GSSS

The results indicated that SLM accounted for the variance in the public service outcome R2= -0.007, F= 0.461 and the SLM coefficient was significant, beta=0.059, p=0.499. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.199, F=10.707, and the mediator coefficient was significant at beta =0.619, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for SLM was decreased. The result of the mediator analysis are showing in table 9.7.14, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between SLM and Public Service Outcomes at p=0.000.

Table 9.7.14: Mediation results of SLM and Public Service Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Ypsslm | -0.007 | 0.461 | 0.059 | 0.499 | - | - |
| YpsslmM1 | 0.160 | 8.409 | -0.039 | 0.640 | 0.638 | 0.000 |
| YpsslmM2 | 0.199 | 10.707 | -0.050 | 0.535 | 0.619 | 0.000 |
| YpsslmM3 | 0.122 | 6.397 | 0.041 | 0.612 | 0.455 | 0.000 |
| YpsslmM4 | 0.185 | 9.846 | 0.008 | 0.919 | 0.551 | 0.000 |
| YpsslmM5 | 0.147 | 7.705 | -0.012 | 0.887 | 0.518 | 0.000 |

### 9.7.15. Association between Government Council Level Measurements and Public Service Outcomes, mediated by Innovation Skills:

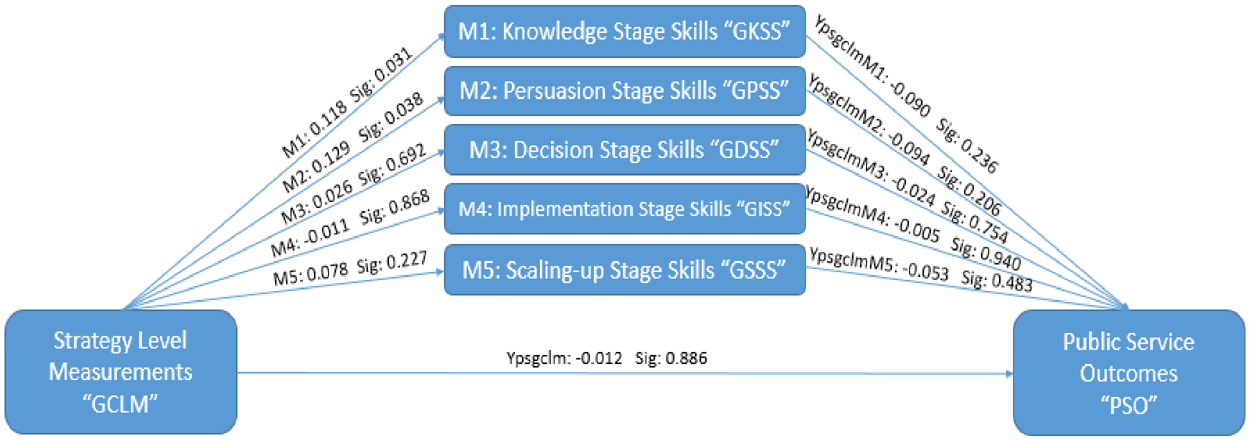



Figure 9.7.15: Mediation effect of IS on the relationship between GCLM and PSO

Figure 9.7.15 is the model summary derived by the multiple regression analysis between government council level measurements and public service outcomes, whereas the innovation skills is the mediator factor in the model. The direct relationship between public service outcomes and government council level is shown by the following basic equation:

**Basic Model**

Ypsgclm = 4.493 – 0.012 GCLM

**Mediator Model**

The mediation effect of innovation skills on the relationship between government council level and public service outcomes is shown in the following mediator equations:

YpsgclmM1 = 1.973 – 0.090 GCLM + 0.661 GKSS

YpsgclmM2 = 2.161 – 0.094 GCLM + 0.633 GPSS

YpsgclmM3 = 2.615 – 0.024 GCLM + 0.461 GDSS

YpsgclmM4 = 2.190 – 0.005 GCLM + 0.553 GISS

YpsgclmM5 = 2.522 – 0.053 GCLM + 0.526 GSSS

The results indicated that GCLM accounted for the variance in the public service outcome R2= -0.013, F= 0.021 and the GCLM coefficient was significant, beta=-0.012, p=0.886. When the mediator was used in the analysis the significance of the model improved. For example the variance of M2 accounted for highest contribution with R2=0.212, F=11.499, and the mediator coefficient was significant at beta =0.633, P=0.000. The results also indicated that when mediator was entered into the analysis, the coefficient for GCLM was decreased. The result of the mediator analysis are showing in table 9.7.15, it indicates that M1, M2, M3, M4 & M5 are significant contributor to the relationship between GCLM and Public Service Outcomes at p=0.000.

Table 9.7.15: Mediation results of GCLM and Public Service Outcomes

| **Model** | **R2** | **F** | **Predictor** | | **Mediator** | |
|---|---|---|---|---|---|---|
| | | | **Beta** | **P** | **Beta** | **P** |
| Ypsgclm | -0.013 | 0.021 | -0,012 | 0.886 | - | - |
| YpsgclmM1 | 0.173 | 9.144 | -0.090 | 0.236 | 0.661 | 0.000 |
| YpsgclmM2 | 0.212 | 11.499 | -0.094 | 0.206 | 0.633 | 0.000 |
| YpsgclmM3 | 0.120 | 6.304 | -0.024 | 0.754 | 0.461 | 0.000 |
| YpsgclmM4 | 0.185 | 9.843 | -0.005 | 0.940 | 0.553 | 0.000 |
| YpsgclmM5 | 0.152 | 7.992 | -0.053 | 0.483 | 0.526 | 0.000 |

## 9.10. Summary

This chapter discussed the results of performed correction and regression test. The analysis performed based on the 3 main constructs of the current study; the performance level measurements, the innovation skills, and the innovation outcomes. The correlation analysis mainly proved significant relationships between innovation skills and innovation outcomes, and partial correlation between performance measurement and innovation skills. While the statistical analysis of this study has not proved a direct relationship between performance measurements and innovation outcomes.

Therefore, the findings in the correlation part have been verified in the regression analysis. In the regression test, the relationship between performance measurement and innovation outcome has been confirmed through the mediation role of innovation skills. In the sense that innovation skills playing a significant role in explaining the variation of innovation outcomes. Statistically, the five independent variables (PLM, PrLM, PoLM, SLM, GCLM) were successfully explained the variation in the success of social, economic, and public service innovation initiatives. In another word, the results suggest that the success of innovation outcomes are significantly dependent on the performance of a project, program, portfolio, organizational strategy and the guidelines and regulations set on government council level.

# 10. CHAPTER TEN: DISCUSSION

## 10.1. Introduction

This chapter discusses the results and analysis of the study. It also presents a holistic discussion of key research questions and outlines the findings reached out of this thesis. The discussion chapter organized into three main parts. The first part discusses the research main constructs and the newly emerged factors from the factor analysis exercise. The second and third part discusses the findings from correlation and regression analysis in relation to the results from the literature review.

## 10.2. Overview of the Study

This research is designed to present the public sector needs after integration of innovation practices, processes, and skills to create potential social impact and economic growth, in addition to the enhancement of public services. This research structured to respond to the challenges stated in the research. There is a need to adopt innovative management techniques in public organizations and stimulate the innovative strategy to deal with new opportunities and constraints. The review of the literature has shown that the innovation practices mainly focused on the organizational level, this research has stepped into the further detailed level to cover organizational projects, program, portfolio and strategy that would ultimately help to streamline the practices at each level towards potential innovation outcomes. The research has responded to the questions by supported hypotheses concerning the association between the innovation practices at each organizational level and potential innovation outcomes with an exploration of mediation role by innovation skills. The study was carried out with empirical evidence using the data collected from the UAE public sector and analyzed quantitatively. The analyses and major findings of this research are covered in the following sections.

## 10.3. Discussion of Research Main Constructs

The theory behind factor analysis examines unobserved correlated variables which are not part of the initial reviewed concepts by the researchers. The approach applies due to the variation across the observed variables reflected by the variation of other unobserved/underlying variables. Basically, researchers refer to this type of statistical method to find independent latent variables, at the same time reduce a large number of factors to a small set of summarized variables and inclusion of relevant variables into a joint group (Fabrigar et al. 1999). Chapter 8 presented the outcomes of the performed factor analysis test of this research paper. However, the discussion point of view, the results of the analysis will be presented in the following paragraphs as a summary of this research findings mainly in relation to the literature review. Table 10.3 shows a description of new latent variables that resulted from factor analysis.

Table 10.3: Summary of Factor Analysis Results

| Variable | # of Predictors | New Latent Variable | New Code | # of Predictors | % of Variance | Cronbach Alpha |
|---|---|---|---|---|---|---|
| Strategy Level Measurements | 12 | Strategic Alignment | SLMN1 | 7 | 36.276 | .904 |
| | | Innovation Diffusion and Communication | SLMN2 | 5 | 29.580 | .874 |
| Knowledge Stage Skills | 15 | Risk-Taking | KSSN1 | 4 | 20.062 | .810 |
| | | Ideas Creation | KSSN2 | 6 | 19.594 | .769 |
| | | Knowledge Sharing | KSSN3 | 5 | 17.224 | .765 |
| Persuasion Stage Skills | 13 | Problem Solving | PSSN1 | 7 | 29.589 | .835 |
| | | Relationship | PSSN2 | 6 | 24.269 | .792 |
| Decision Stage Skills | 13 | Efficacy of Decision | DSSN1 | 6 | 26.841 | .828 |
| | | Authority | DSSN2 | 4 | 21.741 | .766 |
| Implementation Stage Skills | 15 | Accountability | ISSN1 | 11 | 30.461 | .861 |
| | | Leadership | ISSN2 | 4 | 19.216 | .762 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Scaling-up Stage Skills | 15 | Augmentation | SSSN1 | 11 | 35.634 | .906 |
| | | Management Support | SSSN2 | 4 | 19.492 | .775 |

As shown in table 10.3, there is only one variable computed for factor analysis from "performance level measurements' part and that was for the strategy level measurements (SLM). While on the other hand, all the 5 stages in the "innovation skills" part were computed for factor analysis (KSS, PSS, DSS, ISS, SSS). Overall illustration of the table shows that, the highest percentage of variance explained is accounted for the new latent variable of strategic alignment with almost 36% variance, and then the augmentation variable with almost 36% variance, and then innovation diffusion and communication, problem-solving, and accountability, those 3 variables with similar score at almost 30% variance.

### 10.3.1. Strategy Level Factor Analysis

The result of performed tests indicates that SLM which originally had 12 indicators, is now explained by only two new latent variables; Strategic Alignment with 7 predictors coded as SLMN1 and Innovation Diffusion and Communication with 6 predictors coded as SLMN2. It is interesting to note that in all six computed factor analysis of this study, the SLMN1 has the highest percentage of variance explaining the original observed variable at almost 36%, with highly significant reliability value of Cronbach Alpha at .904. Prior studies reviewed in the literature have also noted the importance of strategic alignment factor to measure the successful formation and execution of the corporate strategic plan. For example, David et al. (2004) confirmed that organizational competitiveness is dependent on the strategic alignment between business and internal resources such as technological systems. Jonas (2010) concluded that strategic alignment enables the firm to achieve its objectives without excessive exposure to risk, and providing the best value to the organization. The analysis also shows that the percentage of variance explained by SLMN2 is almost 30% with a high-reliability value of Cronbach Alpha at .874. In this instance innovation diffusion and communication is mainly pointing on the importance of learning about the practice and feeding back the improvements to the organizational strategy performance using the technique of strategic alliances for new or improved products/services, as suggested by Haiyang (2001). Table 10.3 also presents the results of factor analysis for the 5 stages of innovation cycle in relation to skills required in each stage, which had originally between 13 and 15 predictors, and ended up with 2 to 3 new latent variables as explained in the following.

### 10.3.2. Knowledge Stage Factor Analysis

The knowledge stage had initially 15 predictors. This further computed to 3 new latent variables, they are; risk-taking (KSSN1) with 4 predictors and highly reliable value of Cronbach Alpha at .810, in which risk-taking skill explains up to 20% of skills required at knowledge stage. Ideas creation (KSSN2) with 6 predictors and moderately reliable value of Cronbach Alpha at .769, in which idea creation skill explains up to 20% of skills required at knowledge stage. Knowledge sharing (KSSN3) with 5 predictors the moderately reliable value of Cronbach Alpha at .765, in which knowledge sharing skill explains up to 17% of skills required at knowledge stage. Prior studies have noted the importance of those skills to initiate the innovation cycle. For example, with regard to risk-taking skill, Lucia et al. (2007) found that risk-taking is positively associated with innovation as a distinct dimension of entrepreneurial orientation. Max (2017) states people with risk-taking behaviors understands how to mitigate risks in their endeavors towards innovation deployment. Doris et al. (2016) found that senior management who are not willing to take the risk do not support innovation. Regarding idea creation skill Chen et al. (2016) found that patented ideas of better-treated employees could be converted into a commercially successful product or processes to facilitate better operating performance and innovations. Tsai (2001) found that new ideas are stimulated by providing employees with opportunities to allow them to utilize a portion of their paid time to generate innovative ideas. David et al. (2007) Argue that firms attempt to create wealth by identifying creative ideas that set the stage for competitiveness performance and creation of subsequent advantage. The finding of knowledge sharing skill is further supported by many research studies, for example, Tsai and Ghoshal (1998) found that the inter-unit collaboration and knowledge sharing provides opportunities for mutual learning stimulates new idea generation. While, David et al. (2007) suggest that sharing of the ideas, knowledge, opportunities, and expertise help organizations to overcome their challenges. Chen et al. (2016) found that knowledge sharing facilitates better future operating performance. Yesil and Dereli (2013) study revealed that knowledge sharing has been associated with organizational innovation capability. Zhining and Nianxin (2012) empirical study explored that knowledge sharing practices have significant positive effects on innovation speed and quality and financial and operational performance.

### 10.3.3. Persuasion Stage Factor Analysis

The persuasion stage had initially 13 predictors. This further computed to 2 new latent variables, they are; problem-solving (PSSN1) with 7 predictors and highly reliable value of Cronbach Alpha at .835, in which problem-solving skill explains up to 30% of skills required at persuasion stage. Relationship (PSSN2) with 6 predictors and moderately reliable value of Cronbach Alpha at .792, in which relationship skill explains up to 24% of skills required at persuasion stage. The present findings seem to be consistent with other research studies, for example, Jesse et al. (2015) found that wherever problem-solving is linked to innovation, both can lead to national wealth outcome. This demonstrates the significance of problem-solving as skills and efforts in orchestrating the innovation process. Andrea and David (2014) underlined the association of problem solving and innovation and found that problem-solving behaviors is key to innovations. Seok and Jung (2009) found that there is a direct relationship between public sector leaders specifically with good problem-solving skill and implement innovative tasks effectively. The findings of relationship skills have been also supported by other research studies, for example, De Vries et al. (2014) found that networking and inter-organizational relationships (collaboration with private partners/involvement of citizens) comprises 22% of influential environmental factors affecting the diffusion and adaption of innovation in the public domain. Micheli et al. (2012) and Schoeman et al. (2012) have stressed on the need for the establishment of commercialization partnerships as an innovative approach to improving the efficiency and effectiveness of public services. Rincke (2006) found that the horizontal interaction among local governments can be stimulated through the diffusion of policy innovation.

### 10.3.4. Decision Stage Factor Analysis

The decision stage had initially 13 predictors. This further computed to 2 new latent variables, they are; the efficacy of decision (DSSN1) with 6 predictors and highly reliable value of Cronbach Alpha at .828, in which efficacy of decision skill explains up to 27% of skills required at decision stage. Authority (DSSN2) with 4 predictors and moderately reliable value of Cronbach Alpha at .766, in which leading with authority skill explains up to 22% of skills required at decision stage. The present findings seem to be consistent with other research studies, for example, Krueger and Brazeal (1994) found that individuals with high levels of self-efficacy and confidence can better recognize opportunities. Daniel (2005) study explores that entrepreneurs with a strong belief in their capabilities to make strategic decisions are more comprehensive in the information incorporation in which enhances firm performance. Rincke (2006) suggest the decision of adaption innovation can be positively influenced if the information is shared among the reference group.

Carol and Aimee (2006) stressed the involvement of citizens in the decision making process in order to stimulate the delivery of governmental innovations and contribute to the creation of public goods. The finding of leading with authority skill is also supported by other relevant studies, for example, Autor (2015) found that having the right authority power and giving flexible enough decisions for each new opportunity will enable quickly changing direction to exploit better adaption of the innovative idea. Phyra and Aron (2015) found out that providing employees with the right empowerment tool and delegated authority enhances the relationship between exploratory and exploitative service innovation and service quality. Kasemsap (2017) confirmed that innovation support is playing a positive mediation role between transformational leadership and organizational innovation, in addition to that, innovation support is positively mediating the relationship between empowerment and organizational innovation.

### 10.3.5. Implementation Stage Factor Analysis

The implementation stage had initially 15 predictors. This further computed to 2 new latent variables, they are; accountability (ISSN1) with 11 predictors and highly reliable value of Cronbach Alpha at .861, in which leading with accountability skill explains up to 30% of skills required at the implementation stage. Leadership (ISSN2) with 4 predictors and moderately reliable value of Cronbach Alpha at .762, in which leadership skill explains up to 19% of skills required at the implementation stage. The present findings are consistent with other research studies, for example, Regina (2006) found that accountability is one of the six forces affecting innovation either positively or negatively. David and Ted (1992) suggest that policymakers at public sector are responsible to leverage on new innovative ideas that seen as a preference of the citizens and changing of the social environment to better quality conditions. Eva (2012) study explored the contribution of accountability in enhancing the flexibility and innovative capability of the government sector. Literatures has also shown much evidence in supporting the finding of leadership skill, for example, While, Kasemsap (2017) found that there is a positive relationship between transformational leadership and organizational innovation. Sandford (2002) study confirmed that leader can create a supportive work climate for bottom-up innovation. Mehmet and David (2017) study explored empirical evidence that the likelihood of innovative activities can be enhanced mainly by exhibiting leadership behaviors such experimentation, the existence of feedback loop, responding to low performers, and motivation to make improvements.

### 10.3.6. Scaling-up Stage Factor Analysis

The scaling-up stage had initially 15 predictors. This further computed to 2 new latent variables, they are; augmentation (SSSN1) with 11 predictors and highly reliable value of Cronbach Alpha significant at .906, in which augmentation explains up to 36% of skills required at the scaling-up stage. Management support (SSSN2) with 4 predictors and moderately reliable value of Cronbach Alpha at .775, in which management skill explains up to 19% of skills required at the scaling-up stage. The present findings are consistent with other research studies, for example, Chris and Christopher (1998) suggest that improving service products leads the firm to explore new opportunities. Phillips et al. (2015) confirmed that the importance of networking activities to support social innovations through appropriate support mechanisms. Besides, Mulgan (2006) found that the lack of collaborative and networking efforts may place significant barriers to scale-up innovation. Literatures has also shown much evidence in supporting the finding of management skill, for example, Raipa and Giedraityte (2014) found that lack of management support is one of the internal barriers to efficient innovation processes; the lack of management support could include insufficient incentives, staff resistance, and a risk-averse culture. Ross (2009) study confirmed that management support is positively correlated with innovation success, and lack of management support could lead to fruitless innovation activities. Eshaq et al. (2017) empirical study presented an evidence that the top management support affects product innovation and process innovation. Hsiu-Fen (2007) provides empirical evidence that top management support as organizational support factor significantly influences the knowledge sharing process while sharing the knowledge enable the firm to improve innovation capability. Maria and Jose (2016) study resulted that during the new service development process the effective top management support fosters innovation project.

## 10.4. Discussion of Correlation Coefficients Results

The section discusses the achieved outcomes of correlation analysis in relation to the results from the literature review. The discussion attempts to deliberate on the correlational relationship between dependent and independent variables. Table 10.4 shows the correlation coefficient between independent variables (which are: project-level measurements and innovation skills) and the dependent variables (innovation outcomes: social, economic, and public service).

Table 10.4: Correlation Coefficient between independent and dependent variables

| **Independent Variables** | | **Dependent Variable: Innovation Outcomes** | | |
|---|---|---|---|---|
| | | **Social** | **Economic** | **Public Service** |
| Performance Level Measurements | PLM | | | |
| | PrLM | | | |
| | PoLM | | | |
| | SLMN1 | | | |
| | SLMN2 | | .242* | |
| | GCLM | | | |
| Innovation Skills | KSSN1 | .396** | .520** | .434** |
| | KSSN2 | .286* | | .255* |
| | KSSN3 | .385** | .368** | .397** |
| | PSSN1 | .509** | .500** | .492** |
| | PSSN2 | .409** | .444** | .357** |
| | DSSN1 | .370** | .380** | .284* |
| | DSSN2 | .416** | .443** | .341** |
| | ISSN1 | .476** | .438** | .442** |

| | | | | |
|---|---|---|---|---|
| | ISSN2 | .423** | .409** | .400** |
| | SSSN1 | .463** | .423** | .341** |
| | SSSN2 | .284* | .354** | .252* |

### 10.4.1. Correlations of performance level variables and innovation outcomes

The values displayed in the table clearly shows that the results of this study did not reach a conclusion to confirm the direct relationship between performance level measurements and the innovation outcomes using correlation analysis. The experiment asserts that the statistical outcomes had limited evidence about the correlation between the performance level measurements and the innovation outcomes. However, the only moderate correlation is shown in the finding between SLMN2 and economic outcomes. The SLMN2 is a new latent variable described as innovation diffusion and communication, which may have a positive impact on the economy. Interestingly, this finding is in agreement with Haiyang (2001) findings which address that learning and capturing the feeding back on improvements to the corporate strategy leads to new improved products or services which in turns generate more revenue. In addition to the Daglio et al. (2014) who believe innovation diffusion contributes positively to the cost reduction because of the use of new technology and more effective methods in the production process.

In general, and contrary to expectations, the finding of correlation analysis was unexpected and the author suggests this relationship to be further investigated in future research studies using similar variables. Nevertheless, the result of the current experiment may contradict with literature in regards to the direct relationship between the defined level of performance and innovation outcomes. A possible explanation for the abnormality of a direct relationship between performance level and innovation outcomes could be due to lack of maturity of innovation outcomes measurement at a different level of organization, thus probably the respondent is unable to make the connection between the two construct.

The area needs further discussion to assess whether the literature and the innovative performance of project, program, portfolio, strategy, and government council have an influence on social welfare, economic growth, and public service enhancement. These results defer from the findings emerged out of literature, for example, Foken and Cosmuller (2010) suggest for a project assessed against its innovation performance it has to create market impact in which the sales of the product have to be actualized. Kerssens-van et al. (2004) believe program performance can be enhanced with innovative projects using a synergetic approach among them to create a balancing of risks, thus increasing the rate of the successful innovative program. Based on the program objective within the public sector, the impact should be realized either on the social or economic sector or sometimes targeting both sectors. Schentler et al. (2010) argue portfolio success can be assessed of their strategic fitness in addition to the performance of current project within the portfolio. Consequently, the success in those assessment brings the impact in the market and improves the firm's competitiveness. While, as presented in Borins (2002) study that the innovation practice needs to align to the goals of the company and the applied strategies. The concept supports business strategy meant to enhance the organizational survival and gaining a sustainable competitive advantage in their market sector (Barnes, 2008). Dong et al. (2017) argue that with introductions of projects and innovative ideas, there is an improvement or deterioration of government entities and service provision leading to public service growth. The emerged findings from literature review conclude the existence of a relationship between the innovative performance of project, program, portfolio, strategy, and government council on the growth of social and economic factor and enhances service delivery in the public sector.

### 10.4.2. Correlations of innovation skills variables and innovation outcomes

On the other hand, the values displayed in the table clearly show the existence of statistical evidence in the correlation coefficient between innovation skills and innovation outcomes. Therefore, the results of this study confirm that there is a direct relationship between those two variables. Another important finding is that almost all the correlation is highly significant at sig value P<0.01 (shown by ** next to the value) with few at sig value P<0.05 (shown by * next to the value).

#### 10.4.2.1. Correlation of knowledge stage skills and innovation outcomes

At knowledge stage, the highest correlation is shown between KSSN1 "risk-taking" and economic outcomes (.520), while the lowest correlation is shown between KSSN2 "idea creation" and public sector outcomes at (.255). KSSN1 and KSSN3 "knowledge sharing" both have a highly significant correlation with all the three innovation outcomes. The findings of the relationship between risk-taking and innovation outcomes are supported by other studies in the literature such as Lucia et al. (2007); Max (2017); and Doris et al. (2016). From the literature, it is very well understood that risk-taking is an essential skill to explore and initiate innovations in social, economic and public service sectors. Similarly, the findings of the relationship between knowledge sharing and innovation outcomes are supported by other studies in the literature such as Tsai and Ghoshal (1998); David et al. (2007); Chen et al. (2016); Zhining and Nianxin (2012). From the literature, it is very well understood that knowledge sharing is essential skill helps to improve organizational innovation capability in social, economic and public service sectors. In addition, the finding of a relationship between idea creation and social and public outcomes are supported by other studies in the literature such as Chen et al. (2016); Tsai (2001) and David et al. (2007). It is understood from the literature that idea creation positively impacts the social growth and enhance public service delivery. In contrast to earlier findings, however, no evidence of correlation was detected between idea creation and economic outcomes. This results differ from some published studies and particularly contradicts with Chen et al. (2016) who found that patented ideas could be converted into commercially successful product or processes, at the same time David et al. (2007) Claimed that creative ideas can lead to wealth creation in a sense setting the stage for competitiveness performance and creation of subsequent advantage for the organization.

#### 10.4.2.2. Correlation of persuasion stage skills and innovation outcomes

At persuasion stage, the highest correlation is shown between PSSN1 "problem solving" and social outcomes at (.509), while the lowest correlation is shown between PSSN2 "relationship" and public sector outcomes at (.357). PSSN1 and PSSN2 both have a highly significant correlation with all the three innovation outcomes. The findings of the relationship between problem-solving and innovation outcomes are supported by many other studies in the literature such as; Jesse et al. (2015); Andrea and David (2014); De Vries et al. (2014); Seok and Jung (2009). From the literature, it is very well understood that problem solving is essential skills to create solutions and nurture innovations in social, economic and public service sectors. While the findings of the relationship between building relationship skills and innovation outcomes are supported by many other studies in the literature such as De Vries et al. (2014); Micheli et al. (2012); Schoeman et al. (2012); Rincke (2006). In this sense, the skills of building a relationship are essential to improve and cultivate the innovations in social, economic and public service sectors.

#### 10.4.2.3. Correlation of decision stage skills and innovation outcomes

At decision stage, the highest correlation is shown between DSSN2 "authority" and economic outcomes at a value (.443) of the correlation coefficient, while the lowest correlation is shown between DSSN1 "efficacy of decision" and public sector outcomes at a value (.284) of the correlation coefficient. DSSN1 and DSSN2 both have a highly significant correlation with all the three innovation outcomes. The findings of the relationship between efficacy of decision and innovation outcomes are supported by many other studies in the literature such as Krueger and Brazeal (1994); Daniel (2005); Rincke (2006); Carol and Aimee (2006). From the literature, it is very well understood that decision making is an essential skill to encourage innovations in social, economic and public service sectors. The findings of the relationship between authority and innovation outcomes are supported by other studies in the literature such as Autor (2015); Phyra and Aron (2015); Kasemsap (2017). From the literature, it is very well understood that leading with authority is essential to encourage innovations in social, economic and public service sectors.

#### 10.4.2.4. Correlation of implementation stage skills and innovation outcomes

At implementation stage, the highest correlation is shown between ISSN1 "accountability" and social outcomes at a value (.476) of the correlation coefficient, while the lowest correlation is shown between ISSN2 "leadership" and public sector outcomes at a value (.400) of the correlation coefficient. ISSN1 and ISSN2 both have a highly significant correlation with all the three innovation outcomes. The findings of the relationship between accountability and innovation outcomes are supported by other studies in the literature such as Regina (2006); David and Ted (1992); Eva (2012). From the literature, it is very well understood that accountability is an essential factor to drive innovations initiatives in social, economic and public service sectors. While the findings of the relationship between leadership and innovation outcomes are supported by many other studies in the literature such as Seok and Jung (2009); Kasemsap (2017); Sandford (2002); Mehmet and David (2017). From the literature, it is very well understood that leadership skills are one of the most important factors that encourage innovations in social, economic and public service sectors.

#### 10.4.2.5. Correlation of scaling-up stage skills and innovation outcomes

At the scaling-up stage, the highest correlation is shown between SSSN1 "augmentation" and social outcomes at a value (.463) of the correlation coefficient, while the lowest correlation is shown between SSSN2 "management support" and public sector outcomes at a value (.252) of the correlation coefficient. SSSN1 and SSSN2 both factors have a highly significant correlation with all the three innovation outcomes. The findings of the relationship between augmentation and innovation outcomes are supported by other studies in the literature such as Chris and Christopher (1998); Phillips et al. (2015); Mulgan (2006). From the literature, it is very well understood that augmentation is an essential factor to drive the improvement and scaling up innovations initiatives in social, economic and public service sectors. The findings of the relationship between management support and innovation outcomes are supported by many other studies in the literature such as Raipa and Giedraityte (2014); Ross (2009); Eshaq et al. (2017); Hsiu-Fen (2007); Maria and Jose (2016). From the literature, it is very well understood that management support is one of the most important factors that stimulate organization to innovate and create an impact on social, economic and public service sectors.

## 10.5. Discussion of Regression Results

The section discusses the achieved outcomes of regression analysis in relation to the results from the literature review. The discussion attempts to deliberate on the relationship between dependent and independent variables, and identifies the role of the mediator variable in the relationship equations.

### 10.5.1. Discussion on the impact of Performance Level Measurements and Social Outcomes, mediated by Innovation Skills:

Table 10.5.1 shows the results of a regression analysis which defines social innovation outcome as the dependent variable. The figures in the table explain the significant mediation effect of innovation skills in the relationship between all performance measurements levels and social outcomes. Therefore, the results highly support the hypotheses as for the value of Sig= 0.000 for all mediation relationships. The concept confirms that the independent variables significantly predict the dependent variable which in this case is the potential social outcome of innovation.

Table 10.5.1: Summary of regression results between independent variables and social outcomes

| Clusters | M | Unstandardized Beta | Sig. | Hypotheses Support (Yes, No, Partially) |
|---|---|---|---|---|
| Project Level Measurements | M1 | 0.690 | 0.000 | Yes |
| | M2 | 0.698 | 0.000 | Yes |
| | M3 | 0.558 | 0.000 | Yes |
| | M4 | 0.595 | 0.000 | Yes |
| | M5 | 0.585 | 0.000 | Yes |
| Program Level Measurements | M1 | 0.662 | 0.000 | Yes |
| | M2 | 0.685 | 0.000 | Yes |
| | M3 | 0.557 | 0.000 | Yes |
| | M4 | 0.594 | 0.000 | Yes |
| | M5 | 0.572 | 0.000 | Yes |
| Portfolio Level Measurements | M1 | 0.694 | 0.000 | Yes |
| | M2 | 0.674 | 0.000 | Yes |
| | M3 | 0.558 | 0.000 | Yes |
| | M4 | 0.595 | 0.000 | Yes |
| | M5 | 0.577 | 0.000 | Yes |
| Strategy Level Measurements | M1 | 0.669 | 0.000 | Yes |
| | M2 | 0.680 | 0.000 | Yes |
| | M3 | 0.554 | 0.000 | Yes |
| | M4 | 0.593 | 0.000 | Yes |
| | M5 | 0.578 | 0.000 | Yes |
| Government Council Level Measurements | M1 | 0.686 | 0.000 | Yes |
| | M2 | 0.688 | 0.000 | Yes |
| | M3 | 0.559 | 0.000 | Yes |
| | M4 | 0.595 | 0.000 | Yes |
| | M5 | 0.583 | 0.000 | Yes |

The general understanding of the presented findings suggests that the success of potential social outcomes is explainable by the innovative performance levels (project, program, portfolio, strategy, government council) taking into account the importance of required skills at each innovation stage (knowledge, persuasion, decision, implementation, scaling-up).

The presented findings suggest that the impact on the social sector is associated with the success of innovation at the project level considering the enabling factors of skills that support project managers to effectively deploy innovative initiatives. Rajendra and Michael (2006) believe that utilizing the skill of lessons learned enhances the efficiency and effectiveness of e-government services responsible for the sustainability of a project that aims at social, economic and political development. The relevant studies support the idea of initiating the new invention by improving problem-solving capacity particularly at knowledge and decision stage; for example, Andrea and David (2014) support the findings by confirming that problem solving is a key influencer factor for innovations.

Similarly, the presented findings suggest that the impact of performance levels on the social sector is associated with the success of innovation at the program level considering the enabling factors of skills that support program managers to successfully deploy innovative initiatives. Nevertheless, grouping the innovation projects can be more efficient in the sense that unified approaches of risk management can be applied, as agreed by Lavagnon (2009) that grouping of projects can achieve a stable innovation program. Importantly, it is more advantageous to analyze the performance of project risks at program level so that all inherent risks can be accumulated and mitigated for the enterprise benefits (Kerssens-van et al. 2004). For example, a poor performing innovation project can easily be absorbed by another flourishing one with a sure survival chance.

On the other hand, the presented findings suggest that the performance level impact on the social sector is associated with the success of innovation at the portfolio stages considering the enabling factors of skills that support selection managers to successfully deploy innovative initiatives. The studied dimensions of independent and mediator variables indicate that success of social innovation initiatives requires idea evaluation process at portfolio level to ensure the balance of projects in terms of their timing, technical complexity, expected market impact, and risk level. Bonham (2008) support the findings as the prioritization in the process of portfolio management made to the better idea of the projects' risk and health criteria. With efficient evaluation criteria, the better the performance of projects and portfolio. In addition, Ricky (2017) supports the finding as he explains that portfolio is managed and monitored through continuous assessment, which in turn serves as an indicator for organizational performance to create positive impact. At portfolio level, the success of social outcomes could be achieved by taking into account the skills of; idea creation, ability to learn from experience and lead scaling-up innovative ideas successfully, taking accountability to foster adoption of innovation, and having the ability to influence organizational culture in order to encourage novelty and provide management support.

At the strategy level, the presented findings suggest that the impact on the social sector is associated with the success of innovation. The planning level supports the enabling factors of skills to ensure strategy managers successfully deploys innovative initiatives. As it has been claimed by Yolande et al. (1997) that strategic alignment has a positive impact on business performance and the strategic alignment is a better predictor of organizational effectiveness. In this sense, the existence of the alignment approaches from project to strategy level influence on social outcomes. Niven (2003) stressed that smart innovators select sets of indicators that uncover how the innovation practice is aligned with the goals of the company and the applied strategies.

The findings stress that the success of social outcomes could be achieved by the innovative performance of corporate strategy taking into account the skills factors in the innovation process. Therefore, the relevant supporting skills for the success in strategy performance could be; problem-solving, the ability to learn from experience to lead scaling-up innovative ideas successfully, taking accountability to foster adoption of innovation.

Finally, at government council level, the presented findings suggest that the impact of performance level measurements on the social sector is associated with the success of innovation at the policy level considering the enabling factors of skills that support policymakers to successfully deploy innovative initiatives. This explains that the addressed projects at government level influence the social outcomes. The result somehow contradicts with the idea of Joseph and Lill (2013) who believe that organizations have no influence on changing social factors like increased aging population or outbreak of diseases, hunger, or drought.  According to Boyne and Walker (2004), such factors may force the public institutions exit or enter a certain market. The current study differs with mentioned believe of Joseph and Lill (2013), as the social factors of this study attempt to explore the social welfare and growth in a sense of happiness, job creation and talent development. While, O'Byrne et al. (2014) confirm that that effective social innovation in this public sector can be brought by partners with various NGOs to promote civic engagement such as debates on decision making, protecting the use of public resources, and defending human rights. The findings suggest that the success of social outcomes could be achieved at governmental level by taking into account the relevant supporting skills such as; problem-solving, the ability to learn from experience to lead scaling-up innovative ideas successfully, and taking accountability to foster adoption of innovation.

**10.5.2. Discussion on the impact of Performance Level Measurements and Economic Outcomes, mediated by Innovation Skills:**

Table 10.5.2 shows the results of a regression analysis which defines economic innovation outcome as the dependent variable. The figures in the table explain the significant mediation effect of innovation skills in the relationship between all performance measurements levels and economic outcomes. Therefore, the results highly support the hypotheses as for the value of Sig= 0.000 for all mediation relationships. The outcome shows that the independent variables significantly predict the dependent variable which in this case is the potential economic outcome of innovation.

Table 10.5.2: Summary of regression results between independent variables and economic outcomes

| Clusters | M | Unstandardized Beta | Sig. | Hypotheses Support (Yes, No, Partially) |
|---|---|---|---|---|
| Project Level Measurements | M1 | 0.692 | 0.000 | Yes |
| | M2 | 0.758 | 0.000 | Yes |
| | M3 | 0.659 | 0.000 | Yes |
| | M4 | 0.657 | 0.000 | Yes |
| | M5 | 0.688 | 0.000 | Yes |
| Program Level Measurements | M1 | 0.644 | 0.000 | Yes |
| | M2 | 0.718 | 0.000 | Yes |
| | M3 | 0.657 | 0.000 | Yes |
| | M4 | 0.654 | 0.000 | Yes |
| | M5 | 0.666 | 0.000 | Yes |
| Portfolio Level Measurements | M1 | 0.700 | 0.000 | Yes |
| | M2 | 0.741 | 0.000 | Yes |
| | M3 | 0.658 | 0.000 | Yes |
| | M4 | 0.656 | 0.000 | Yes |
| | M5 | 0.685 | 0.000 | Yes |
| Strategy Level Measurements | M1 | 0.636 | 0.000 | Yes |
| | M2 | 0.710 | 0.000 | Yes |
| | M3 | 0.645 | 0.000 | Yes |
| | M4 | 0.632 | 0.000 | Yes |
| | M5 | 0.658 | 0.000 | Yes |
| Government Council Level Measurements | M1 | 0.683 | 0.000 | Yes |
| | M2 | 0.744 | 0.000 | Yes |
| | M3 | 0.655 | 0.000 | Yes |
| | M4 | 0.658 | 0.000 | Yes |
| | M5 | 0.683 | 0.000 | Yes |

The inclusive understanding of the presented findings suggests that the success of potential economic outcomes could be explained by the innovative performance levels taking into account the importance of required skills at each innovation stage.

The presented findings suggest that the performance attribute impact on the economic sector is associated with the success of innovation at the project level considering the enabling factors of skills that support project managers to successfully deploy innovative initiatives. A project could give a platform for operational requirements that satisfy the economic needs of the institutes (Kloppenborg & Laning, 2012). Thus, the project can be the basic foundation and a source of experiences as the firsthand touch of innovation. It, therefore, gives a groundwork to the whole system of an innovation strategy.

In addition, the presented findings suggest that the impact of performance measurements on the economy creates the success of innovation at the program level considering the enabling factors of skills that support program managers to successfully deploy innovative initiatives. The results also indicate that to create economic impact it requires organizational learning approach (Stephen & Jonathan 2015) adds that the approach keeps the team members up-to-date of the most current knowledge within their field of work at the program level. This finding further supported by many other studies such as Russell (2017), stressed on the importance of providing executives and teams with the understanding and knowledge needed at the program level to lead and manage innovations within their enterprise. The findings suggest that the achievement of potential economic outcomes could be explained by the innovative performance of the program taking into consideration the relevant supporting skills of; problem-solving, leadership and having the ability to learn from experience to lead scaling-up innovative ideas successfully.

On the other hand, the presented findings suggest that the performance measurements impact on the economic sector is associated with the success of innovation at the portfolio level considering the enabling factors of skills that support portfolio managers to successfully deploy innovative initiatives. The factors of independent and mediator variables indicate that success of public sector innovative initiatives requires idea evaluation process at portfolio level to ensure the balance of projects in terms of their timing, technical complexity, expected market impact, and risk level. Bonham (2008) support the same finding as for the prioritization in the process of portfolio management that leads to adopting the better idea of the projects' risk and health criteria. The reliable proper the evaluation criteria, the better the performance of projects and portfolio. The government department managers with the right knowledge and tools are better able to fit into such approach and a set of potentially shared value elements aiming at innovations of economic viability. At the portfolio level, the success of economic outcomes could be achieved by taking into account the relevant supporting skills of; leadership, risk-taking, having the ability to learn from experience to lead with accountability and scaling-up innovative ideas successfully.

At the strategy level, the presented findings suggest that the performance outcome impact on the economic sector is associated with the success of innovation at the strategy level. Considering the enabling factors of skills, it creates avenues that support strategy managers to successfully deploy innovative initiatives. As pointed out by Gupta, Gollakota, and Srinivasan (2007), public organizations operate under close public interest and have to meet heightened value-laden expectations for fairness, transparency, and accountability. Budget allocations are processed only after their final approval by legislative bodies, and a large number of audits, hearings, and investigations continuously conducted in governmental institutions as a control measure to assess performance and compliance. Therefore, the community-driven strategy empowers local governments and communities through public policing, resident control, and other measures for taking part in the activity of the organization. The enterprising strategy is a powerful method of fund generation through innovative cost saving, privatization, and public resource/program use. Governmental organizations also use an anticipatory strategy when they need to forecast and resolve upcoming problems by means of long-range budgeting and inter-departmental planning, contrarily the decentralized strategy option is used for decision-making decentralization through labor-management partnership. A catalyst strategy is a viable option for setting nation economic direction and priorities. The economic approach to change guides selective directives on produced goods, services, and employment opportunities for the community at large. The venturing in society ends up not only generating wealth but also helping members of public realize their potentials to invest in the innovative world. The findings stress that the success of economic outcomes could be achieved by the innovative performance of corporate strategy taking into account the skills factors in the innovation process.

Finally, at government council level, the presented findings confirm that the performance variables impact on the economic sector is associated with the success of innovation at the policy level considering the enabling factors of skills that support policymakers to successfully deploy innovative initiatives. The concept supports the addressed projects at government level that influence the potential economic outcomes. Public sector organizations are the largest and the most influential organizations one may encounter, encompassing a set of powerful governmental policies. The public sector is responsible for the production of core public goods and services essential for nations' welfare, including healthcare, education, social security, justice, defense, criminal justice, etc. (Cunningham & Harney 2012). It is critical to the national economy to provide a sound foundation for civilized life by means of ensuring individual security and favorable market operation conditions (Kelman 2008). Hence, the economic importance of smooth operation and successful performance of public sector organizations come to the forefront. The findings suggest that the success of social outcomes could be achieved at a governmental level by taking into account the relevant innovation skills.

### 10.5.3. Discussion on the impact of Performance Level Measurements and Public Service Outcomes, mediated by Innovation Skills:

Table 10.5.3 shows the results of a regression analysis which defines public service innovation outcome as the dependent variable. The figures in the table explain the significant mediation effect of innovation skills in the relationship between all performance measurements levels and public service outcomes. Therefore, the attained results highly support the hypotheses as for the value of Sig= 0.000 for all mediation relationships. In this context independent variables significantly predict the dependent variable which in this case is the potential public service outcome of innovation.

Table 10.5.3: Summary of regression results between independent variables and public service outcomes

| Clusters | M | Unstandardized Beta | Sig. | Hypotheses Support (Yes, No, Partially) |
|---|---|---|---|---|
| Project Level Measurements | M1 | 0.673 | 0.000 | Yes |
| | M2 | 0.560 | 0.000 | Yes |
| | M3 | 0.459 | 0.000 | Yes |
| | M4 | 0.553 | 0.000 | Yes |
| | M5 | 0.533 | 0.000 | Yes |
| Program Level Measurements | M1 | 0.628 | 0.000 | Yes |
| | M2 | 0.621 | 0.000 | Yes |
| | M3 | 0.458 | 0.000 | Yes |
| | M4 | 0.553 | 0.000 | Yes |
| | M5 | 0.512 | 0.000 | Yes |
| Portfolio Level Measurements | M1 | 0.719 | 0.000 | Yes |
| | M2 | 0.649 | 0.000 | Yes |
| | M3 | 0.460 | 0.000 | Yes |
| | M4 | 0.555 | 0.000 | Yes |

| | | | | |
|---|---|---|---|---|
| | M5 | 0.532 | 0.000 | Yes |
| Strategy Level Measurements | M1 | 0.638 | 0.000 | Yes |
| | M2 | 0.619 | 0.000 | Yes |
| | M3 | 0.455 | 0.000 | Yes |
| | M4 | 0.551 | 0.000 | Yes |
| | M5 | 0.518 | 0.000 | Yes |
| Government Council Level Measurements | M1 | 0.661 | 0.000 | Yes |
| | M2 | 0.633 | 0.000 | Yes |
| | M3 | 0.461 | 0.000 | Yes |
| | M4 | 0.553 | 0.000 | Yes |
| | M5 | 0.526 | 0.000 | Yes |

As per inclusive review, the understanding of the presented findings suggests that the success of potential public service outcomes could be explained by the innovative performance taking into account the importance of required skills at each innovation stage.

The presented findings suggest that the impact of performance level dimensions on the public service sector is associated with the success of innovation at the project level. The breakthrough relies on the enabling factors of skills that support project managers to successfully deploy innovative initiatives. Public service generally has taken an enormous step with their communal benefits projects to enhance service delivery methods owing to new advancements (De Vries, Victor, and Lars, 2016). Moreover, the civil service inventions focus on individual innovation skills, who possess unique talents that becomes a potential resource to implement the public empowerment ambitious dream (Sørensen & Jacob 2016). Therefore, the findings assert that the success of potential public service outcomes could be achieved at the project level by taking into account the innovation skills.

In addition, the presented findings indicate that the performance measurement impact on the public service sector defines the success of innovation at the program level. The enabling factors sourced from skills that support program managers ensure successful deployment of innovative initiatives. The results also indicate that to enhance public service delivery the performance dimensions requires organizational learning approach (Stephen & Jonathan 2015) to keep the team members up-to-date on the most current knowledge within their field of work. The findings are further supported by many other studies such as Russell (2017) who stressed on the importance of providing executives and teams with the understanding and knowledge needed at the program level to lead and manage innovations within their enterprise. The findings also confirm that the success of public service outcomes supports the innovative performance of the program taking into account the skills of; knowledge sharing and having the ability to learn from experience to lead scaling-up innovative ideas successfully.

On the other hand, the presented findings suggest that the impact on the public service is associated with the success of innovation at the portfolio level with the presence of enabling factors of skills that support portfolio managers to successfully deploy innovative initiatives. The factors of independent and mediator variables indicate that the success of public sector innovative initiatives relies on the idea evaluation process at the portfolio level to ensure the balance of projects. The finding also admits that the significance of synergetic approach primarily for the prevalence of shared value elements supports the project portfolio to leverage information about risk and resources sharing. Jeffrey (2005) agree with this finding through stating that optimizing the synergy within portfolio set the stage for successful application and integration of selection management. Portfolio managers with the right knowledge and tools have the better chance to fit into such approach and a set of potentially shared value elements aiming at innovation in public services delivery. At the portfolio level, the success of public service outcomes could be achieved by taking into account the relevant supporting skills of idea creation, risk-taking, and having the ability to learn from experience and scaling-up innovative ideas successfully.

At the strategy level, the presented findings suggest that the impact of performance elements on the public service links with the success of innovation at the strategy level considering the enabling factors of skills that support strategy managers to fruitfully deploy innovative initiatives. Those strategy factors as a group of dimensions of independent and mediator variables indicate that the success of public service innovative initiatives requires clarity in vision and strategies to meet stakeholders' expectation and well position the organization in the future. The concept totally supports the findings of many other studies such as Moxley (2004) who found out that strategic planning in the public sector is mostly vision-based, which is the most successful strategy for this category of organizations.

While (Rajegopal et al. 2007) stated that alignment between portfolio and strategy is a sound way of bringing the strategic and operational aspects of organizational performance, Bommert (2010) had a contradicting approach. He stated that innovation strategy starts from a visionary manager who explores solutions using their expertise to increase the speed of service delivery and quality improvement to the public service. The findings stress that the success of public service outcomes can be achieved through the innovative performance of corporate strategy taking into account the skills factors in the innovation process such as problem-solving skill, and the ability to learn from experience to lead scaling-up innovative ideas successfully.

Finally, at government council level, the presented findings indicate that the impact on the public service is associated with the success of innovation at the policy level considering the enabling factors of skills that support policymakers to successfully deploy innovative initiatives. The aspect supports the concept the addressed projects at government level have an influence on potential public service outcomes. The public sector has taken a new approach to accommodate innovation at the community services level. The latest trends involve the public-private partnership

(PPP) that provides innovation in both production and management of public services (Afuah 2003). According to the networks governance and collaborative measures in public domain, change ensures social-oriented service benefits from the incorporated partnership. The findings confirm that the success of public service has a likelihood of achievements at the governmental level by taking into account the innovation skills that create an opportunity for individuals. Such changes create an avenue for individuals to realize potential pattern with private sectors and improve the public service that directly impacts them.

## 10.6. Summary

The chapter has provided an overview of the study, discussed the summary of key results, analyzed and interpreted the findings in light of relevant researches and studies in the literature. Further, the discussion attempted to respond to raised research questions and validated the proposed research hypothesis.

The chapter has organized the discussion of findings mainly in three subsections. First, the descriptive analysis part, the author highlighted the top-ranked indicators in each cluster based on their importance and in relation to the findings form sourced from the literature. Secondly, the results of the factor analysis presented thoroughly discuss the variation of newly identified factors. Finally, in the correlation analysis part, the result of rapport between dependent and independent variables is discussed and supported by the literature. Further, the summary of regression analysis result is presented and discussed in light of the findings from the literature review.

# 11. CHAPTER ELEVEN: CONCLUSION

## 11.1. Introduction

The chapter has persistently presented the informed conclusion and restating the research objectives and methodology used to carry out this study. The chapter also consolidates the most important implications and state the contribution to the knowledge drawn out throughout the research. Finally, this chapter is closed out by identifying relevant prospects that may give a rise to future research opportunities.

## 11.2. The accomplishment of research objectives

### 11.2.1. Objective 1: To review and extract innovation practices and performance measurements

With the objective of steering the firm's innovation processes, there is the need for an imperative structure that could adequately measure the innovation activities (Janssen 2011). Overall, as investigated by many researchers that measuring the performance of innovation varies in its structure and applied metrics. Rating of innovation consistent also can cover inputs, strategy, culture and company structure, innovation process and the outputs and outcomes (Kerssens-van et al. 2004). In case there is a need for the approach of measuring the performance, the researcher arranges the performance in a structure that it looks at different organizational levels, rather than investigating the performance on organizational wide (Schentler et al. 2010). At project, program, and portfolio levels, the research extracted most critical performance criteria of measurements such as capturing the lessons learned, prototyping new project ideas, stakeholders' involvement, knowledge sharing, taking acceptable risks, and idea evaluation using success factors. Most of those mentioned metrics has been top-ranked in the descriptive analysis and have a significant influence on the potential innovation outcomes. While at the strategic and governmental level the research extracted critical measurements that would influence the diffusion of innovation. Mainly influenced by those who act supportively to the organizational culture, top management role and engagement, clarity of vision and strategies, addressing public concerns, value adding to the economy and society-wide. Those measurements shaped the basis of innovation practices constructs. In a sense that they are highly reliable in the measured scale and have a recognizable level of consistency among survey participants.

### 11.2.2. Objective 2: To review and extract innovation skills required for innovation diffusion

As stated by Dong et al. (2014) that some organizations' top managements fail to institute formal processes of innovation within their companies. Whereas, the development of new ideas is the determinant of long-term success (Hatten and Timothy 2015). Therefore, ideas are nurtured and mindset created to give the right approach towards innovation. The novelty decision-making process consists of knowledge, persuasion, decision, implementation, and scaling-up of resources (Rogers 1983). Nevertheless, public entities can be viewed to face limitations from barriers such as poor change management and lack of skills or incentives and rewards to innovation (Albury 2005). In fact, human resources form the fundamental competency and capability of an institution and are vital in designing innovative and creative ideas (Marr 2009). Many skills create necessary aspects to effectively diffuse each stage of innovation; including leadership divergent and critical thinking, problem-solving, strategic thinking, analytical skills, numerical abilities, and technological skills (Pagon et al. 2008). The current study emerged the highest ranked and the most influencer skills and management behaviors; including leadership, proactive problem solving, risk-taking, having the ability to learn from experience to lead with accountability and scaling-up innovative ideas successfully.

### 11.2.3. Objective 3: To find the association between innovation practices, skills, and outcomes

Despite the lack of innovation practices in the public sector, researchers showed interests in investigating the innovation performance and its impact on the community (Hansen and Birkinshaw 2007; Kaplan 2017). However, this research attempts had the main target to extend the knowledge on the association between fundamental constructs and drivers forces the effective implementation of innovation strategy. The finding emerged from this research confirms the significance of the relationship between innovation practices using a critical set of measurements at different organizational level. The potential innovation impact on social, economic and public service sectors, obviously devising individuals and management with clear innovation approach and required skills are also reviewed widely.

### 11.2.4. Objective 4: To carry out a survey among public sector practitioners

The study assesses extensive stakeholders attached to the public sector like any other segment in an economic setting. Among the evaluated stakeholder who has a direct impact on innovation, adoption includes the public-based organization management, staff, and clients. Each of the party to the sector has to some extent a potential of influencing the process of novelty. Throughout this research project, a survey has been developed after a critical review of the literature. The developed survey has served this research as quantitative instrument tool to generate data from the public sector.

### 11.2.5. Objective 5: To analyze the data from the survey using several statistical techniques.

The study has applied both the regression and correlation methods of data analysis. The two approaches widely used in this research avails consistency in comparing the raised variables. The developed questionnaires used for surveying and gathering vital innovation showed reliability by targeting all levels of the public sector. The instruments used were checked for validity and reliability to ensure data consistency before running the analytical tests. Several statistical techniques were computed in order to generate a conclusion drawn out from the research findings. The techniques applied also had the main basis on the SPSS tool and included descriptive analysis, factor analysis, correlation, and regression analyses.

### 11.2.6. Objective 6: To report the results and confirm the research hypotheses.

The research proposed 3 primary hypotheses, they mainly provide assumptions on the association between innovation practices and potential innovation outcomes, also proposes an association between innovation skills and potential results. Finally, it assumes the mediation role of innovation skill in the association between innovation practice and potential innovation outcomes. Those hypotheses were reported in relation to the finding from statistical evidence and empirical study at UAE public sector. The results successfully confirmed hypotheses 2 & 3 as the findings emerged statistical evidence of relevant relationships between the variables. However, contrary to expectations, hypothesis 1 has not shown evidence of the relationship between innovation practice and potential innovation outcomes. The experiment asserts that the statistical outcomes had limited evidence about direct relationship between the two constructs. A possible explanation for the abnormality of such direct relationship could be due to lack of knowledge and maturity in innovation practices in public sector. Therefore the author suggests that this direct relationship to be further investigated in future research studies using similar variables.

## 11.3. Robustness of the research methodology

This research was carried out using the help of a quantitative approach to meet the aim and objectives of the study, as discussed in chapter 6. The study relied on a stratified sampling method to ensure that all subdivisions in the public sector had an equal representation on the selected population. The selection of the research approach mainly derived from the particular research questions and the nature of the presented problem that needs to be further investigated. The study had no agreement on the appropriate research paradigms among the selected study research domain of innovation and strategy management. The research carried forward with the quantitative approach to best achieve the objectives and the specified research questions. Therefore, a questionnaire was developed as the main source for data collection and that was after conducting a thorough review in the literature to predict the factors that may synthesize the main construct of this study. To confirm the questionnaire validity and ensure the selected methods and the research process are appropriately performed, the developed questionnaire was sent to 8 professionals in the innovation and strategy management field in the UAE government organizations for the pilot study purposes. As a result, the adjustments were done on the questionnaire to reflect the gathered feedback from the pilot study. Those adjustments were mainly rephrasing of the statements, simplifying the words and combining similar items. Hence, the questionnaire was sent to the targeted sample; who mainly represent the United Arab Emirates public sector using various communication channels including emails and social media applications. The collected data and the used measurement scale were checked for completeness, reliability, and consistency before running the data into the analysis. Different statistical methods were computed using the SPSS to examine the data descriptively and analytically and seek the research findings. Descriptive statistics present the demographic attributes and the variation in the respondent answers. Factor analysis computed to examine unobserved correlated factors that have not been observed initially by the researcher, accordingly the factors were regrouped based on new latent variables. Finally, the correlation and regression analyses performed to explore the direction and significance of the relationship between innovations practices, skills, and potential innovation outcomes.

## 11.4. Implications

This study has investigated the critical performance factors that practitioner have to pay attention to effectively diffuse innovation strategy. It attempted to explore the relationship between innovations at different levels that include; project, program, portfolio, strategy, and government council level and they are likely to create an impact on social, economic and public service sectors. Since the research assessed innovation at different arranged levels; from single project up to entire government level, therefore, this study constructs implications in a sense to reflect the practices at each of those investigated level. The following implications and conclusions can be drawn from the present study:

### 11.4.1. Project managers:

- To foster innovation at the project level; this research recommends for project managers to act as a proactive problem solver and strive to lead with accountability by adapting lessons learned from past experience in order to initiate and scale-up innovation ideas successfully.

- To create social impact; this research recommends for project managers to devise the team member with an actual tool to generate and prototype new ideas and facilitate the collaboration with involved stakeholders to turn the innovative idea off the ground.

### 11.4.2. Program managers:

- To foster innovation at the program level; this research recommends for program managers to cultivate their knowledge sharing skills and be adaptive to learn from experience that leads them to scaling-up innovative ideas successfully.

- To create an impact on economic and public service sector; this research recommends for program managers to stimulate the culture of organizational learning by building up a knowledge and resources sharing platform in order to set the stage of keeping the teams stay up-to-date of the most current knowledge within their field of work.

### 11.4.3. Portfolio managers:

- To foster innovation at portfolio level; this research recommends for portfolio managers to act as a source of idea creation, risk-taking, demonstrate strong ability leadership ability to lead with accountability and ability to learn from experience to scale-up innovative idea successfully. In addition, demonstrate outstanding ability to influence organizational culture in order to encourage innovation activities and provide management support.

- To create an impact on the social, economic, and public service sector; this research recommends for portfolio managers to stimulate the innovation among project portfolio by evaluating innovative ideas to ensure the balance of projects in terms of their timing, technical complexity, expected market impact, and risk level. In addition, leverage on the approach of shared information about successful innovative ideas to create a sense of innovation ownership at a high level.

### 11.4.4. Executives and Strategy leader:

- To foster innovation at strategy level; this research recommends for strategy managers to be devised with proactive problem-solving skills to anticipate the organizational gaps, demonstrate the ability to learn from experience to lead with accountability and to scaling-up innovative ideas successfully.
- To create an impact on social and public service sector; this research recommends for strategy managers to put in place a clear vision and strategy that match well with industry evolvements and can ultimately be translated into innovation initiatives. Besides, create a well-structured, measurable and achievable approach at a strategic level to ensure innovative ideas are aligned to strategy before being implemented.

### 11.4.5. Policy makers at federal and local government:

- To foster innovation at government level; this research recommends for policymakers at the federal and local government to capitalize at problem-solving skills, and demonstrate abilities at assign accountability and directing the decision makers at organizations towards augmentation of innovative ideas.
- To create an impact on the social sector; this research recommends for policymakers at the federal and local government to foster strategic partnerships with academia bodies to promote innovation researches and incubators in as sense problem of public concern in the government sector are consistently addressed as innovative public value initiatives.

## 11.5. Contribution to the knowledge

Throughout reviewing of previous studies in innovation diffusion and strategy literature, many related factors and relationships were found to exist in the same research domain. Nevertheless, the contribution of this study is to set the stage for successful application and integration of these approaches, taking account of the fact that innovation is studied at the different performance level of public sector context; from project up to entire nation level. At the same time, the value of this study lays within the way this research has been structured as it attempts to create an association line from innovative public concern project reaching out to the impact realization of social welfare, economic growth, and public service enhancement. This research further contributes to the existing body of knowledge in the following specific areas:

- The overall study has developed an interest of different scholars on the innovation as a source of success for most public-oriented organizations. Embracing the idea of novelty creates a source of knowledge for all levels of management to achieve decisive innovation outcomes. The contribution to the body of knowledge developed by this thesis is that the public-based sectors operate like any other business entity. In an event that bodies like the government come in the target is to access the three major concepts developed in the conceptual framework; innovation practices, innovation skills, and potential innovation outcomes. The practices create the best ever platform for innovation diffusion through the creation of projects, program, portfolio, strategy, and a governing council. Like any other organization, public sectors need to create innovation platforms on basis of skills to scale their outputs. The innovation skills determine the accuracy of the practices deployed across the practice areas. It also bridges the outcomes with source efforts in that resource invested in public-based projects attracts certain skills to achieve a particular level of innovation. Importantly, the potential outcomes provide critical understanding that as a public-based organization, a business is driving on the right or wrong direction. The sensitivity and reliability of innovation, therefore, requires innovation skills scale-up all set practices with the goals made to achieve excellent outcomes. However, the major drawback impacting the sector not only in UAE but across other regions is that competitive advantage in most cases is unconsidered. Thus as a platform of learning private sector has mounted pressure through offering quality goods at a relatively affordable cost. The approach has forced the public oriented-businesses not only to learn but also embrace innovation practice, skills, and outcomes as a source of improving existing structures.

- The present study makes several noteworthy contributions to the literature review which has emerged the theoretical understanding of innovation practices at a different level, as most of the studies looked at only organizational level. The research demonstrates uniqueness constructs in that requires academic researchers and practitioners to bridge the gap in the existing body of knowledge.

- The key strength of this study is that the research is conceptualized to drive the innovation strategy through performance oriented devised by a set of required skills at each stage of innovation process aiming at impact realization in public sector.

- The empirical findings in this study provide a new understanding of public sector context, the insight created is that different factors have emerged across the delivery sections that do influence innovation performance and outcomes.

- This research extends our knowledge on the strategic importance of innovation diffusion with a newly developed model that provide arguments of highest ranking factors and their significance based on empirical evidence.

- The study also has several practical applications as presented earlier at different organizational and governmental level. The approaches including skills, portfolio, strategies and laid structures design every role played to achieve the set objectives.

## 11.6. Limitations and future research

This study gives rise to future research opportunities, some of which stem from its limitations. There is a number of important limitations need to be considered:

a) First of all, this study investigates the interface between innovation practices and potential innovation outcomes focusing on creating the impact at three different sectors; social, economic, and public services. The author assumes that the research would conclude to more valuable findings if the study is designed to streamline the study direction towards one specified outcome/impact. Therefore, further research is needed to account for one sector in more depth to point out at more viable implications benefiting the practitioner at the particular sector.

b) Although the study has successfully demonstrated the relationship between the defined innovation practices levels and the potential innovation outcomes using the mediator effect, it has certain limitations in terms of exploring the direct relationship between innovation practices and the potential outcomes of innovation using current surveying method and statistical evidence. Hence, it would be interesting to further explore the significant factors that may empirically confirm the direct relationship between innovation practices level and potential innovation outcomes.

c) The current research was not specifically designed to evaluate more factors that may have an influence on innovation strategy, as the existing study only focuses on the explored set of required skills and behaviors at each innovation diffusion stage. The author assumes that there could be more enabler factors that influence the performance of innovation strategy and novelty practices in the public sector. Therefore, it is recommended that further research could be undertaken in a similar area to investigate other enabler factors for diffusion innovation strategy, other than innovation skills.

d) Despite the fact that the developed questionnaire by the author added value to the existing knowledge, the statements may exert some limitation in terms of understanding. With English being more of a second language in UAE, interpretation of some wording in questionnaires turned out as problematic. The words including the "Inquisitiveness" "Persuasion" "Endurance" used in the questionnaire raised contradiction with some participant interpreting it on own way of understanding. Specifically, for those words within the statements, the researcher received some clarification requests mostly from junior level participants who accounts for only 33% of the respondents, whereas the middle and top management were the majority participants with 67%. This justify that the data gathered are consistent and has no serious effect on the validly and reliability of the instrument.

e) Finally, this research used the method of surveying by distributing questionnaire across the public sector in the UAE. However, the research findings are limited by the perception of those participants. For this study some defined hypotheses had limitations, this raised due to the lack of maturity in public sector innovation practices and performance measurement at different organizational and policy level. Thus the respondent was unable to make the connection between the research constructs. Thus, future studies could build on recent developed researched questionnaire and constructs to investigate on such perspectives that would provide deeper insights into how innovation practices at different organizational levels would fruitfully contribute to emerging innovation diffusion concepts in the public sector.

## 11.7. Summary

The chapter has discussed the conclusions drawn out from this research highlighting the main aspects of adapted methodology, implications for the practitioner, the contribution to the body of knowledge.

Importantly, the overall thesis shows that modernizing the public sector ensures constant diffusion of new skills improving goods and services provided. The public-based sector having the capacity to incorporate current innovative ideas stands a big chance of success and gaining of competitive advantage over the private instituted business. The innovation diffusion across public-oriented businesses relies on set platforms to integrate ideas for public impact opportunities.

The integration between innovation stages and innovation skills have extensively informed the knowledge behind innovation success in public organization. Whereas, the public segmentations have an equal chance of operating programs and portfolios in an innovative way to earn a competitive advantage. The willingness of individuals working in a public sector will always support novelty if at all they have opportunities to prove their capabilities. Public sector stakeholders and policymakers must support to discover their skills and the role they can play to promote innovation. The abilities discovered on the workforce should not rely only on technical skills but also on social and behavioral expertise in order to have a deeper understanding of innovation diffusion.

The aspect of innovation across different sectors including the public sector is inevitable. The Public oriented-organization are at the receiving end of collapsing given the excellent operation of the competitive private sector at affordable costs. Therefore, the diffusion of innovation across the public-oriented organization is emphasized to embrace new techniques to fully meet the social economic and growth needs. Despite raising limitations based on the public sector capabilities to enforce and manage innovation, the researcher has confidence in the embraced innovation skills and set management structures to enhance innovation adoption.

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## Appendices:

**Appendix 1 - Research Invitation Letter**

**Appendix 2 - Research Questionnaire**

**Appendix 3 - Detailed Descriptive Analysis**

**Appendix 4 - Detailed Regression Analysis**

# Appendix 1 - Research Invitation Letter

# Research Invitation Letter

Dear Participant,

The UAE leadership emphasizes the importance of innovation and strategy management across all sectors through the UAE Vision 2021 by setting the aim to be among the most innovative nations in the world.

This research aims to develop a framework to measure innovation performance across different levels (from project level up to an entire economy). The research will also examine skills that are necessary for innovation diffusion.

The data collected will be used solely for the academic purposes. If you have any questions about the questionnaire, you may contact me on 120035@student.buid.ac.ae or mobile: 0505658828

Alternatively, you may communicate with my director of studies, Professor Halim Boussabaine on 04 279 1437 or halim@buid.ac.ae

Thank you for your time and appreciate your support to complete this study

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# Appendix 2 - Research Questionnaire

# Research Questionnaire

## PART 1 - Innovation Performance Measurement

This part attempts to explore the innovation performance measurement from single innovation project level up to an entire economy.

### 1.1 - Project Level Measurements

Please rate the extent to which you agree or disagree with the following statements:

| # | **Project Level Measurements** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| PLM1 | People are encouraged to submit ideas in your organization | | | | | |
| PLM2 | We generate and prototype new project ideas | | | | | |
| PLM3 | We can use work time to work with others on project ideas | | | | | |
| PLM4 | We capture the lessons learned from our projects | | | | | |
| PLM5 | We involve our stakeholders very closely with our business so that we all fully understand their project needs | | | | | |

### 1.2 - Program Level Measurements

Please rate the extent to which you agree or disagree with the following statements:

| # | **Program Level Measurements** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| PrLM1 | Lessons learned from projects are shared among the program | | | | | |
| PrLM2 | Team members stay up-to-date of the most current knowledge within their field of work | | | | | |
| PrLM3 | At the program level we are able to take “acceptable risks” when necessary | | | | | |
| PrLM4 | Culture at the program level encourages risk-taking and collaboration efforts to implement new ideas | | | | | |
| PrLM5 | Information about successful ideas is shared between projects and between program team members | | | | | |

## 1.3 - Portfolio Level Measurements

Please rate the extent to which you agree or disagree with the following statements:

| # | **Portfolio Level Measurement** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| PoLM1 | Ideas in portfolio are evaluated to ensure the balance of projects in terms of their timing, technical complexity, expected market impact and risk level | | | | | |
| PoLM2 | Employees participate in important decisions taking on new ideas | | | | | |
| PoLM3 | Constructive and critical analysis is conducted to determine if full implementation of an idea is viable | | | | | |
| PoLM4 | The suitability of the idea is checked against the indicators of success | | | | | |
| PoLM5 | Indicators to assess innovation results are defined | | | | | |
| PoLM6 | Information about successful ideas is shared among innovation project portfolio | | | | | |

## 1.4 - Strategy Level Measurements

Please rate the extent to which you agree or disagree with the following statements:

| # | **Strategy Level Measurements** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| SLM1 | Strategies are clear enough that we can translate it into innovation initiatives | | | | | |
| SLM2 | Strategies match well with the way the market is evolving | | | | | |
| SLM3 | Approaches exist to ensure ideas are aligned to strategy before implementation | | | | | |
| SLM4 | Top management foster a culture that supports innovation | | | | | |
| SLM5 | Top management have a clear innovation vision and strategy | | | | | |
| SLM6 | Top management ensure that roles and responsibilities are properly assigned and communicated | | | | | |
| SLM7 | Innovation objectives exist at relevant functions and levels, which are consistent with the innovation vision and strategy | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| SLM8 | Team members are free to bring ideas forward, regardless of their formal position | | | | | |
| SLM9 | Innovation process consists of structured and clear methods to develop new ideas and transform them into innovation value with the quality and timelines to achieve the results | | | | | |
| SLM10 | Innovation-specific recognition and reward systems are established | | | | | |
| SLM11 | There is a strong diffusion network between the opinion-leader and the change agent influences innovation decisions | | | | | |
| SLM12 | Information about successful ideas is shared within the organisation and among the strategic partners | | | | | |

### 1.5 - Government Council Level Measurements

Please rate the extent to which you agree or disagree with the following statements:

| # | **Government Council Level Measurements** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| GCLM1 | Our innovation project has successfully addressed an important problem of public concern in the government sector | | | | | |
| GCLM2 | Our innovation project, or aspects of it, has shown promise of being spread or replicated by other government entities | | | | | |
| GCLM3 | Diffusion of innovation strategy has added value, saved costs and generated new revenues across the government departments | | | | | |
| GCLM4 | Projects and programs are related to the objectives and goals of the government strategy and achieve economic value on the national level | | | | | |
| GCLM5 | Information about successful ideas is shared with other governments | | | | | |

## PART 2 - Innovation Skills

This part attempts to explore the skills required at each stage of the innovation process to diffuse innovation strategy in the public sector.

### 2.1 - Knowledge (Discovering innovative ideas and find further information about it)

Please rate the extent of your agreement with the following innovation skills at the innovation knowledge stage cycle:

| # | **Knowledge Stage Skills** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| KSS1 | Creativity can be fostered by removing barriers to knowledge-sharing | | | | | |
| KSS2 | Idea formation skill helps individuals to generate innovative ideas | | | | | |
| KSS3 | Evaluating ideas is based on a predetermined cost-benefit analysis | | | | | |
| KSS4 | Problem solving is approached from innovation perspective | | | | | |
| KSS5 | Curiosity is a prerequisite for knowledge searching | | | | | |
| KSS6 | Insights drive individuals to seek realistic improvement opportunities | | | | | |
| KSS7 | Inquisitiveness for opportunity catalyzes the acquisition of awareness knowledge | | | | | |
| KSS8 | Inquisitiveness for opportunity builds resourcefulness for knowledge modification and application | | | | | |
| KSS9 | Adventure in trying out new approaches facilitates knowledge-search | | | | | |
| KSS10 | Openness to new approaches expands opportunities | | | | | |
| KSS11 | Ability to explore new ventures catalyzes the creation of knowledge | | | | | |
| KSS12 | The capacity to explore ideas catalyzes problem-solving | | | | | |
| KSS13 | Teamwork fosters risk-sharing leading to better generation of ideas | | | | | |
| KSS14 | Communication improves knowledge sharing and diffusion | | | | | |
| KSS15 | Continuous improvement facilitates knowledge improvement | | | | | |

**2.2 - Persuasion** (Individual shows interest on specific innovative idea)

Please rate the extent of your agreement with the following innovation skills at the innovation persuasion stage cycle:

| # | **Persuasion Stage Skills** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| PSS1 | The presence of relationship skills facilitates the individual to search for feedback from multiple stakeholders | | | | | |
| PSS2 | Persuasion skill helps individual to assess the innovative idea using enabler factors | | | | | |
| PSS3 | Persuasion skill improves individual ability to build new idea based on accurate information | | | | | |
| PSS4 | Collaboration helps the individual to better understand the innovative idea | | | | | |
| PSS5 | A pursue of team approach to information search, returns a richer variety of ideas | | | | | |
| PSS6 | Problem solving skills enable the individual to persevere in searching for innovative ideas | | | | | |
| PSS7 | Communication skills improve the efficacy of the information-search process | | | | | |
| PSS8 | Multi-cultural competence enables the individual to follow information from different cultural contexts | | | | | |
| PSS9 | An entrepreneurial mindset induces the individual to focus on the possibilities not the challenge | | | | | |
| PSS10 | Sociability creates a more welcoming environment for individuals with information to share | | | | | |
| PSS11 | Problem visualization can empower individuals to pursue on innovative ideas | | | | | |
| PSS12 | Lateral thinking makes the individual more resourceful with the available information | | | | | |
| PSS13 | Lateral thinking makes the individual more likely to pursue innovative ideas because they can think beyond the obstacles | | | | | |

**2.3 - Decision** (The choice to either adopt or reject the identified innovation)

Please rate the extent of your agreement with the following innovation skills at the innovation decision stage cycle:

| # | **Decision Stage Skills** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| DSS1 | Understanding the risks associated with innovative idea increases the chance of adopting the idea | | | | | |
| DSS2 | Smart and diligent individuals spend more time on the evaluation of potential innovation | | | | | |
| DSS3 | Being proactive in the innovation idea catalyzes the decision-making process | | | | | |
| DSS4 | Teamwork enriches the decision process | | | | | |
| DSS5 | Problem solving skills catalyze the decision process | | | | | |
| DSS6 | Communication of risk enrich the decision on adopting new ideas | | | | | |
| DSS7 | Decision-making power facilitates adoption of new ideas | | | | | |
| DSS8 | Unbiased thinking leads to the selection of the most realistic choice | | | | | |
| DSS9 | Incubation techniques influence the degree to which the innovation meets the expected outcomes | | | | | |
| DSS10 | Modeling concepts provide adequate simulation to make informed decisions | | | | | |
| DSS11 | Prototyping efficiently exposes the real world efficacy of the decision by testing it accordingly | | | | | |
| DSS12 | Understanding and manipulating information sets facilitates more accurate forecasting for the performance of the innovation | | | | | |
| DSS13 | The presentation of the argument for and against the decision, facilitates informed buy-in or resistance | | | | | |

## 2.4 - Implementation (Related to the execution of the selected innovation)

Please rate the extent of your agreement with the following innovation skills at the innovation implementation stage cycle:

| # | **Implementation Stage Skills** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| ISS1 | Implementation skill helps adapt the right tools and technologies to complete a task, project, or assignment | | | | | |
| ISS2 | Employees must be tenacious and persistent to the innovation implemented | | | | | |
| ISS3 | Relationship-building skill encourages knowledge-sharing during implementation of the innovative idea | | | | | |
| ISS4 | Accountability fosters stakeholder adoption of innovation | | | | | |
| ISS5 | Performance measurement encourages the adoption of innovation | | | | | |
| ISS6 | Planning effectively shows the level of fit between the innovation and its usability | | | | | |
| ISS7 | Coordination streamlines implementation processes to improve value chain efficiency | | | | | |
| ISS8 | Teamwork provides the opportunity to successful implementation of new ideas | | | | | |
| ISS9 | Problem solving skills assist in eliminating obstacles for innovation implementation | | | | | |
| ISS10 | Ability to communicate issues generates opportunities in the implementation from multiple perspectives | | | | | |
| ISS11 | Creative abilities have positive impact on innovation quality | | | | | |
| ISS12 | Risk-taking skills enables the implementers to continue with the process and therefore transcend challenges | | | | | |
| ISS13 | Managerial skills influence the rates of accountability and delegation | | | | | |
| ISS14 | Managerial skills determine the efficacy of team work in innovation implementation | | | | | |
| ISS15 | The level of cohesion between the team determines the success of implementation | | | | | |

### 2.5 - Scaling-up (Expanding the implementation of the innovation)

Please rate the extent of your agreement with the following innovation skills at the innovation scaling-up stage cycle:

| # | **Scaling-up Stage Skills** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| SSS1 | The managerial approach determines stakeholder involvement in scaling-up | | | | | |
| SSS2 | The managerial approach has influence on the risk which is acceptable in scaling-up | | | | | |
| SSS3 | Team cohesion determines the team's divergence on scaling-up | | | | | |
| SSS4 | Emotional intelligence exposes the stakeholders' perception about the scaling-up of the adopted innovation | | | | | |
| SSS5 | Endurance to obstacles provides a foundation on which the implementers can scale-up the adoption of innovation | | | | | |
| SSS6 | Openness on new ideas and continuous improvement assist in the scaling-up process | | | | | |
| SSS7 | Sharing information and expertise inside the organization helps in the scaling-up process | | | | | |
| SSS8 | Negotiation skill overcomes barriers among people that may hinder the scaling-up of the innovation | | | | | |
| SSS9 | Individuals with negotiation skill provide sources for assisting the scale-up process | | | | | |
| SSS10 | Delegating responsibility and providing support improve the chance of the scaling-up success | | | | | |
| SSS11 | Collaboration makes it easy for the scaling-up process | | | | | |
| SSS12 | Collaborative efforts facilitate allocation of resources for networking and sharing ideas, knowledge, and skills to improve the scaling process | | | | | |
| SSS13 | Recognizing opportunities for change and improvement facilitates the scaling process | | | | | |
| SSS14 | The existence of the continuous improvement ethos facilitates the scaling process | | | | | |
| SSS15 | Accepting feedback and learning from experience and mistakes leads to scaling-up innovative ideas successfully | | | | | |

## PART 3 - Innovation Outcomes

Please rate the extent of your agreement with the following innovation outcomes:

| # | **Innovation Outcomes** | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **Social Outcomes** | | | | | | |
| SO1 | Happiness is an important societal quality, as it fosters nation's welfare, wealth accumulation and invention | | | | | |
| SO2 | Happy people are more optimistic, confident, and are willing to navigate untested environments to achieve goals and build sound institutions | | | | | |
| SO3 | Innovation is a crucial factor for ensuring economic growth, competitiveness, and the wellbeing of society | | | | | |
| SO4 | Innovation creates jobs and gives people opportunities to utilize their potential, while being active economic and social players | | | | | |
| SO5 | Innovation leads to the development of talented work force | | | | | |
| **Economic Outcomes** | | | | | | |
| EO6 | Innovation leads to the creation of new sources of wealth | | | | | |
| EO7 | Innovation leads to financial optimization | | | | | |
| EO8 | Innovation leads to service performance improvement | | | | | |
| EO9 | Innovation leads to the discovery of the unmet needs of current and future generation | | | | | |
| **Public Service Outcomes** | | | | | | |
| PSO10 | Innovation can be instrumental in enhancing products, services and processes in public sector | | | | | |
| PSO11 | Innovation plays a significant role in encouraging and stimulating service improvement | | | | | |
| PSO12 | Innovative and talented individuals are attracted to places where their talent is recognized, appreciated, and deployed | | | | | |

## PART 4 - Demographic

Please provide the required personal details through marking a tick next to the answer of your choice:

**1. Type of your organisation**

☐ Public ☐ Private ☐ Semi-Government ☐ Other

**2. Size of your organisation (employees number)**

☐ 1 - 49 ☐ 50 - 999 ☐ 1,000 - 4,999 ☐ 5,000 or more ☐ Don't know

**3. Job level**

☐ Employee ☐ Middle Management ☐ Top Management

**4. No. of total years of work experience**

☐ 0 – 2 ☐ 3 – 5 ☐ 6 - 10 ☐ 11- 19 ☐ 20 or above

**5. Educational level**

☐ High school graduate or Less ☐ College degree
☐ Higher Diploma/Bachelor degree ☐ Masters ☐ Doctorate or above

**6. Age**

☐ Less than 24 ☐ 25 - 30 ☐ 31 - 40 ☐ 41 – 50 ☐ 51 or above

**7. Gender**

☐ Male ☐ Female

**8. Nationality**

☐ UAE National ☐ Non UAE National

- End of Questionnaire -
Thank you for your participation

# Appendix 3 - Detailed Descriptive Analysis

### 7.4. Detailed Descriptive Analysis of the Variables

The descriptive statistics analysis of all variables are provided in below sub-sections:

#### 7.4.1. Project Level Measurements (PLM)

Table (7.4.1) provides descriptive statistics of the project level measurements plotted according to the number of respondents. This category of innovation performance measurements factor comprises five variables which are: PLM1, PLM2, PLM3, PLM4, and PLM5. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for PLM1 “people are encouraged to submit ideas” is (3.85), above the neutral value of (3) and has standard deviation of (1.06) indicates moderate agreement among respondents. The median and the mode of this variable is (4) which means the most frequent answer of respondents was “agree”. The distribution of this variable is negatively skewed scored at (-.739). This indicates that there is agreement among respondents that people are encouraged to submit the ideas in their organisation, as the majority of respondents answered “agree”; as presented in column (4) shown in figure (A7.1) and table (A7.1). In addition, PL4 “We capture the lessons learned from our projects” and PLM5 “We involve our stakeholders very closely with our business so that we all fully understand their project needs” have almost similar distribution tendency with mean values of (3.68) and (3.58) and have a standard deviation of (1.11) and (1.25) respectively, indicating a moderate deviation from the mean. The distribution for both variables are negatively skewed at score of (-.761) and (-.589) as shown in figure (A7.4) and table (A7.5). This clearly explains that there are substantial probabilities of respondents capturing lessons learned from projects at their organisations and they involve their stakeholders very closely with their business to fully understand their project needs.

The distribution of PLM2 “We generate and prototype new project ideas” and PLM3 “We can use work time to work with others on project ideas” is displayed in figure (A7.2) and (A7.3). The mean scored at (3.51) and (3.47) and has a standard deviation of (1.13) and (1.23) respectively. Despite of variations in respondents views, both variables has moderate negative skewness of (-.453) and (-.299), indicating moderate agreement between respondents with more of them think that they are able to generate and prototype new project ideas and they can use their work time to work with others on those ideas.

Table 7.4.1: Descriptive Statistics of Project Level Measurements

**Statistics**

| | PLM1 | PLM2 | PLM3 | PLM4 | PLM5 |
|---|---|---|---|---|---|
| Mean | 3.85 | 3.51 | 3.47 | 3.68 | 3.58 |
| Median | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | 4 | 4 | 5 | 4 | 4 |
| Std. Deviation | 1.063 | 1.131 | 1.239 | 1.116 | 1.257 |
| Variance | 1.130 | 1.279 | 1.534 | 1.245 | 1.580 |
| Skewness | -.739 | -.453 | -.299 | -.761 | -.589 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | -.121 | -.764 | -.950 | -.079 | -.715 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 |
| Range | 4 | 4 | 4 | 4 | 4 |

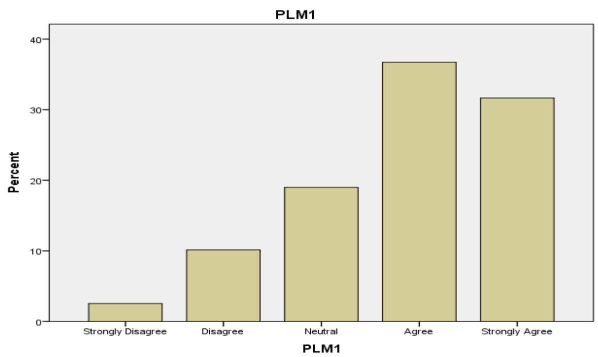



Figure (A7.1) Distribution of people are encouraged to submit ideas in your organisation

**PLM1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Disagree | 8 | 10.1 | 10.1 | 12.7 |
| | Neutral | 15 | 19.0 | 19.0 | 31.6 |
| | Agree | 29 | 36.7 | 36.7 | 68.4 |
| | Strongly Agree | 25 | 31.6 | 31.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.1) Distribution of people are encouraged to submit ideas in your organisation

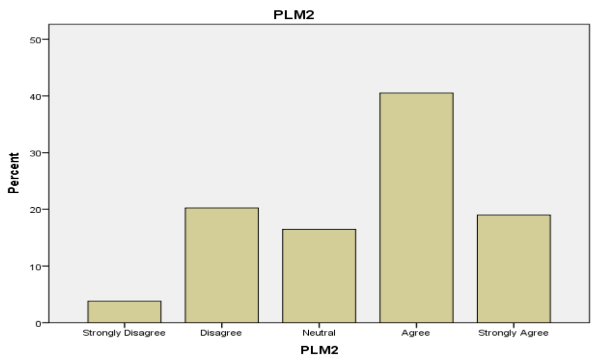



Figure (A7.2) Distribution of we generate and prototype new project ideas

**PLM2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 16 | 20.3 | 20.3 | 24.1 |
| | Neutral | 13 | 16.5 | 16.5 | 40.5 |
| | Agree | 32 | 40.5 | 40.5 | 81.0 |
| | Strongly Agree | 15 | 19.0 | 19.0 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.2) Distribution of we generate and prototype new project ideas

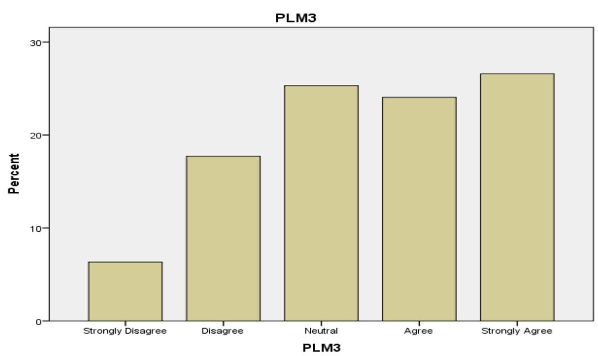



Figure (A7.3) Distribution of we can use work time to work with others on project ideas

**PLM3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 5 | 6.3 | 6.3 | 6.3 |
| | Disagree | 14 | 17.7 | 17.7 | 24.1 |
| | Neutral | 20 | 25.3 | 25.3 | 49.4 |
| | Agree | 19 | 24.1 | 24.1 | 73.4 |
| | Strongly Agree | 21 | 26.6 | 26.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.3)Distribution of we can use work time to work with others on project ideas

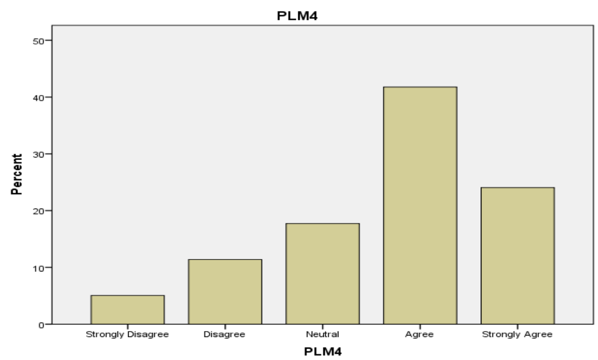



Figure (A7.4) Distribution of we capture the lessons learned from our projects

**PLM4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Disagree | 9 | 11.4 | 11.4 | 16.5 |
| | Neutral | 14 | 17.7 | 17.7 | 34.2 |
| | Agree | 33 | 41.8 | 41.8 | 75.9 |
| | Strongly Agree | 19 | 24.1 | 24.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.4) Distribution of we capture the lessons learned from our projects

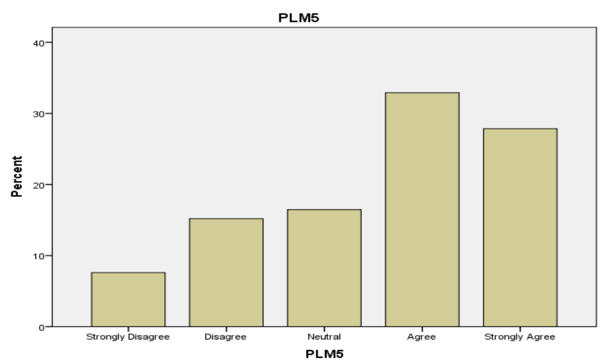



Figure (A7.5) Distribution of we involve our stakeholders very closely with our business so that we all fully understand their project needs

**PLM5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 6 | 7.6 | 7.6 | 7.6 |
| | Disagree | 12 | 15.2 | 15.2 | 22.8 |
| | Neutral | 13 | 16.5 | 16.5 | 39.2 |
| | Agree | 26 | 32.9 | 32.9 | 72.2 |
| | Strongly Agree | 22 | 27.8 | 27.8 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.5) Distribution of we involve our stakeholders very closely with our business so that we all fully understand their project needs

### 7.4.2. Program Level Measurements (PrLM)

Table (7.4.2) provides descriptive statistics of the program level measurements plotted according to the number of respondents. This category of innovation performance measurements factor comprises five variables which are: PrLM1, PrLM2, PrLM3, PrLM4, and PrLM5. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for PrLM1 "Lessons learned from projects are shared among the program" is (3.33), above the neutral value of (3) and has standard deviation of (1.15). Similarly, PrLM5

“Information about successful ideas is shared between projects and between program team members” has a mean value of (3.30) and standard deviation of (1.15). Therefore, it is noticed that respondents views varies between agreement and disagreement of sharing the information and lessons learned from projects among the program. However, as both variables have a mode value of (4) represented in the “agree” column and they are negatively skewed scored at (-.267) and (-.217) respectively, this indicates that the majority of the respondents towards the view of agreeing on the information and knowledge sharing among program.

PrLM2 “Team members stay up-to-date of the most current knowledge within their field of work” has a mean value of (3.25) and standard deviation of (1.11). Similarly, PrLM3 “At the program level we are able to take “acceptable risks” when necessary” has a mean value of (3.46) and a standard deviation of (1.10). Also, PrLM4 “Culture at the program level encourages risk-taking and collaboration efforts to implement new ideas” has a mean value of (3.28) and a standard deviation of (1.15). Those variables indicating a moderate agreement among respondents with high respondents have neutral view (around 25% of total respondents), as the median value scored at (3) particularly for the PrLM2 and PrLM4 while scored at (4) for PrLM3 as (40%) of total respondents answered “agree”. Nevertheless, the majority of respondents are towards the agreement with those statements as the highest values fall under column (4) selecting the “agree” option. The skewness value for the variables are negatively scored at (-.087), (-.409) and (-.107) respectively, indicating slightly agreement of staying up-to-date with current knowledge of the fields and encouragement of risk taking culture to implement new ideas. The distribution of all variables are shown in the figure (A7.6) to (A7.10) and table (A7.6) to (A7.10).

Table 7.4.2: Descriptive Statistics of Program Level Measurements

**Statistics**

| | PrLM1 | PrLM2 | PrLM3 | PrLM4 | PrLM5 |
|---|---|---|---|---|---|
| Mean | 3.33 | 3.29 | 3.46 | 3.28 | 3.30 |
| Median | 4.00 | 3.00 | 4.00 | 3.00 | 3.00 |
| Mode | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | 1.152 | 1.111 | 1.107 | 1.154 | 1.159 |
| Variance | 1.326 | 1.235 | 1.226 | 1.332 | 1.342 |
| Skewness | -.267 | -.087 | -.409 | -.107 | -.217 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | -.942 | -.903 | -.738 | -.940 | -.810 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 |
| Range | 4 | 4 | 4 | 4 | 4 |

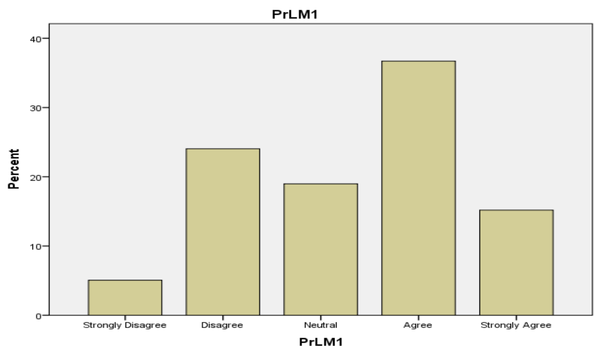



Figure (A7.6) Distribution of lessons learned from projects are shared among the program

**PrLM1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Disagree | 19 | 24.1 | 24.1 | 29.1 |
| | Neutral | 15 | 19.0 | 19.0 | 48.1 |
| | Agree | 29 | 36.7 | 36.7 | 84.8 |
| | Strongly Agree | 12 | 15.2 | 15.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.6) Distribution of lessons learned from projects are shared among the program

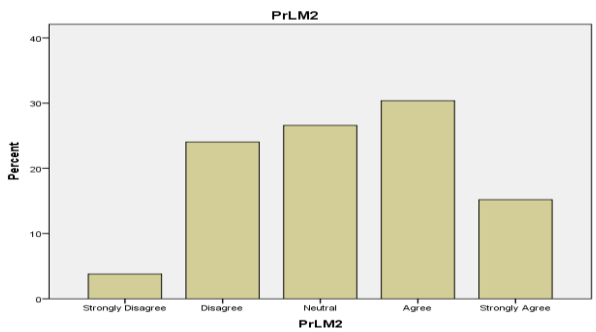



Figure (A7.7) Distribution of team members stay up-to-date of the most current knowledge within their field of work

PrLM2

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 19 | 24.1 | 24.1 | 27.8 |
| | Neutral | 21 | 26.6 | 26.6 | 54.4 |
| | Agree | 24 | 30.4 | 30.4 | 84.8 |
| | Strongly Agree | 12 | 15.2 | 15.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.7) Distribution of team members stay up-to-date of the most current knowledge within their field of work

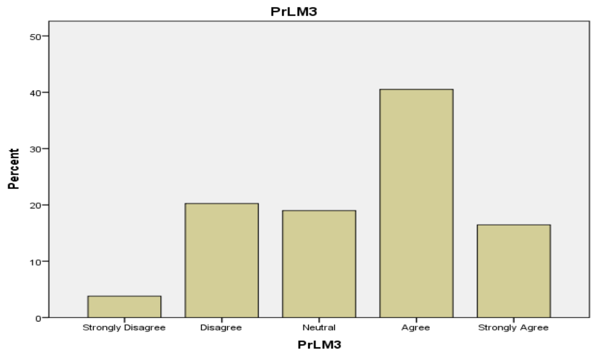



Figure (A7.8) Distribution of at the program level we are able to take “acceptable risks” when necessary

**PrLM3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 16 | 20.3 | 20.3 | 24.1 |
| | Neutral | 15 | 19.0 | 19.0 | 43.0 |
| | Agree | 32 | 40.5 | 40.5 | 83.5 |
| | Strongly Agree | 13 | 16.5 | 16.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.8) Distribution of at the program level we are able to take “acceptable risks” when necessary

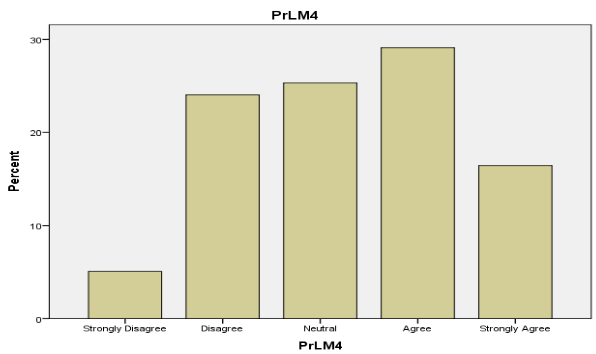



Figure (A7.9) Distribution of culture at the program level encourages risk-taking and collaboration efforts to implement new ideas

**PrLM4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Disagree | 19 | 24.1 | 24.1 | 29.1 |
| | Neutral | 20 | 25.3 | 25.3 | 54.4 |
| | Agree | 23 | 29.1 | 29.1 | 83.5 |
| | Strongly Agree | 13 | 16.5 | 16.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.9) Distribution of culture at the program level encourages risk-taking and collaboration efforts to implement new ideas

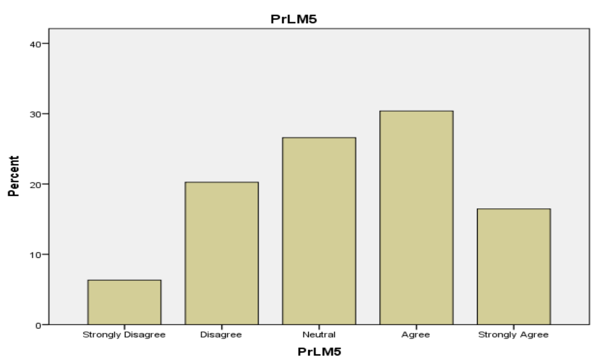



Figure (A7.10) Distribution of information about successful ideas is shared between projects and between program team members

**PrLM5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 5 | 6.3 | 6.3 | 6.3 |
| | Disagree | 16 | 20.3 | 20.3 | 26.6 |
| | Neutral | 21 | 26.6 | 26.6 | 53.2 |
| | Agree | 24 | 30.4 | 30.4 | 83.5 |
| | Strongly Agree | 13 | 16.5 | 16.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.10) Distribution of information about successful ideas is shared between projects and between program team members

### 7.4.3. Portfolio Level Measurements (PoLM)

Table (7.4.3) provides descriptive statistics of the portfolio level measurements plotted according to the number of respondents. This category of innovation performance measurements factor comprises six variables which are: PoLM1, PoLM2, PoLM3, PoLM4, PoLM5, and PoLM6. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for PoLM1 “Ideas in portfolio are evaluated to ensure the balance of projects in terms of their timing, technical complexity, expected market impact and risk level” is (3.28), above the neutral value of (3) and has standard deviation of (1.12). Similarly, PoLM2 “Employees participate in important decisions taking on new ideas” has a mean value of (3.05) and standard deviation of (1.21). PoLM4 “The suitability of the idea is checked against the indicators of success” has a mean value of (3.37) and standard deviation of (1.10). PoLM5 “Indicators to assess innovation results are defined” has a mean value of (3.22) and standard deviation of (1.08). With those values, it is noticed that respondents views varies between agreement and disagreement, particularly for the PoLM3 in which almost divided in half with very high value for neutral choice (almost 30% of total respondents) reflected in the mode value (3). The skewness values are negatively scored ranged between (-.186) and (-.008) resulting in no clear skewness shape and deviation of respondents views around the mean.

As shown in figure (A7.13) and (A7.16), PoLM3 “Constructive and critical analysis is conducted to determine if full implementation of an idea is viable” and PoLM6 “Information about successful ideas is shared among innovation project portfolio” have clear skewness shape towards negative side scored at (-.410) and (-.433) respectively, indicating a moderate agreement among respondents regarding conducting constructive analysis on new ideas and information about successful ideas is shared among the portfolio.

The distribution of all variables are shown in the figure (A7.11) to (A7.16) and table (A7.11) to (A7.16).

Table 7.4.3: Descriptive Statistics of Portfolio Level Measurements

**Statistics**

| | PoLM1 | PoLM2 | PoLM3 | PoLM4 | PoLM5 | PoLM6 |
|---|---|---|---|---|---|---|
| Mean | 3.28 | 3.05 | 3.32 | 3.37 | 3.22 | 3.27 |
| Median | 3.00 | 3.00 | 4.00 | 3.00 | 3.00 | 3.00 |
| Mode | 4 | 3 | 4 | 4 | 3[a] | 4 |
| Std. Deviation | 1.120 | 1.218 | 1.193 | 1.100 | 1.082 | 1.106 |
| Skewness | -.126 | -.099 | -.410 | -.186 | -.008 | -.433 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | -1.000 | -.876 | -.754 | -.783 | -.836 | -.569 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 | .535 |
| Range | 4 | 4 | 4 | 4 | 4 | 4 |

a. Multiple modes exist. The smallest value is shown

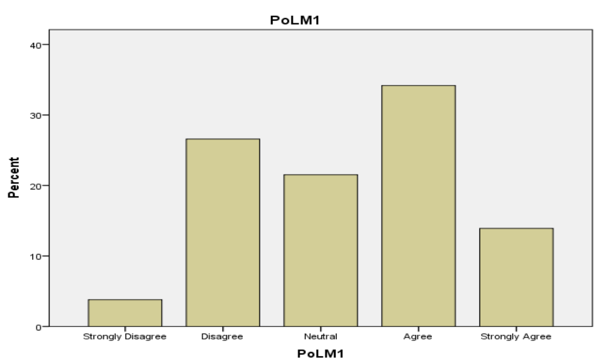



Figure (A7.11) Distribution of ideas in portfolio are evaluated to ensure the balance of projects in terms of their timing, technical complexity, expected market impact and risk level

**PoLM1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 21 | 26.6 | 26.6 | 30.4 |
| | Neutral | 17 | 21.5 | 21.5 | 51.9 |
| | Agree | 27 | 34.2 | 34.2 | 86.1 |
| | Strongly Agree | 11 | 13.9 | 13.9 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.11) Distribution of ideas in portfolio are evaluated to ensure the balance of projects in terms of their timing, technical complexity, expected market impact and risk level

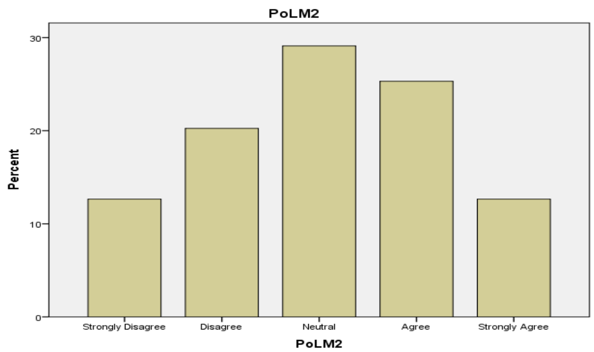



Figure (A7.12) Distribution of employees participate in important decisions taking on new ideas

**PoLM2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 10 | 12.7 | 12.7 | 12.7 |
| | Disagree | 16 | 20.3 | 20.3 | 32.9 |
| | Neutral | 23 | 29.1 | 29.1 | 62.0 |
| | Agree | 20 | 25.3 | 25.3 | 87.3 |
| | Strongly Agree | 10 | 12.7 | 12.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.12) Distribution of employees participate in important decisions taking on new ideas

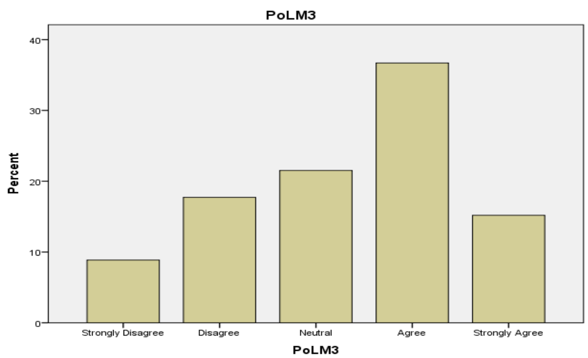



Figure (A7.13) Distribution of constructive and critical analysis is conducted to determine if full implementation of an idea is viable

**PoLM3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 7 | 8.9 | 8.9 | 8.9 |
| | Disagree | 14 | 17.7 | 17.7 | 26.6 |
| | Neutral | 17 | 21.5 | 21.5 | 48.1 |
| | Agree | 29 | 36.7 | 36.7 | 84.8 |
| | Strongly Agree | 12 | 15.2 | 15.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.13) Distribution of constructive and critical analysis is conducted to determine if full implementation of an idea is viable

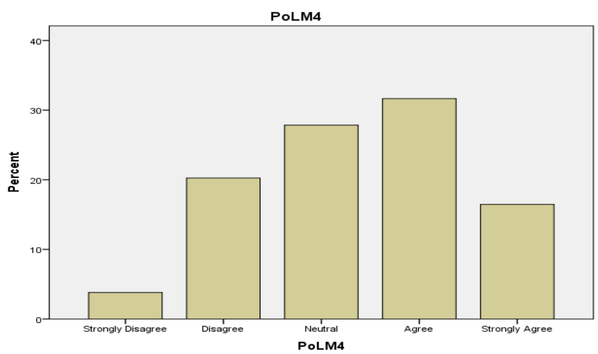
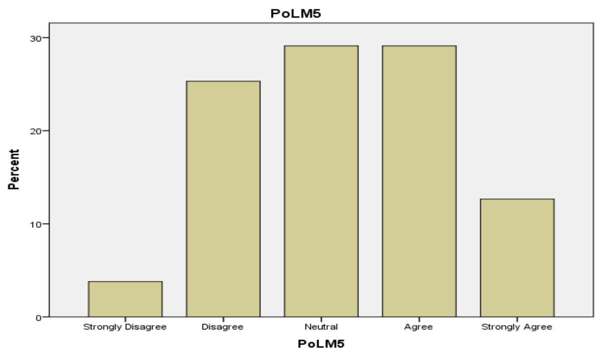



Figure (A7.14) Distribution of the suitability of the idea is checked against the indicators of success

**PoLM4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 16 | 20.3 | 20.3 | 24.1 |
| | Neutral | 22 | 27.8 | 27.8 | 51.9 |
| | Agree | 25 | 31.6 | 31.6 | 83.5 |
| | Strongly Agree | 13 | 16.5 | 16.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.14) Distribution of the suitability of the idea is checked against the indicators of success

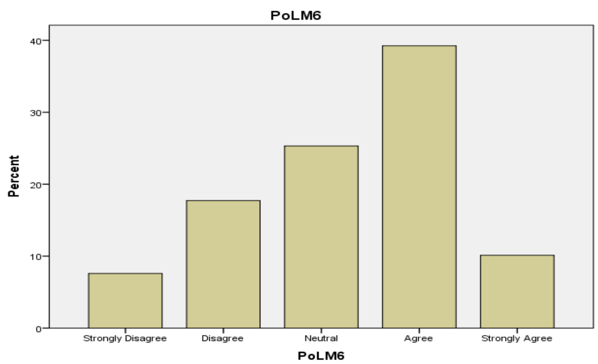



**PoLM5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 20 | 25.3 | 25.3 | 29.1 |
| | Neutral | 23 | 29.1 | 29.1 | 58.2 |
| | Agree | 23 | 29.1 | 29.1 | 87.3 |
| | Strongly Agree | 10 | 12.7 | 12.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.15) Distribution of indicators to assess innovation results are defined

Table (A7.15) Distribution of indicators to assess innovation results are defined




**PoLM6**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 6 | 7.6 | 7.6 | 7.6 |
| | Disagree | 14 | 17.7 | 17.7 | 25.3 |
| | Neutral | 20 | 25.3 | 25.3 | 50.6 |
| | Agree | 31 | 39.2 | 39.2 | 89.9 |
| | Strongly Agree | 8 | 10.1 | 10.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.16) Distribution of information about successful ideas is shared among innovation project portfolio

Table (A7.16) Distribution of information about successful ideas is shared among innovation project portfolio

### 7.4.4. Strategy Level Measurements (SLM)

Table (7.4.4) provides descriptive statistics of the strategy level measurements plotted according to the number of respondents. This category of innovation performance measurements factor comprises twelve variables which are: SLM1, SLM2, SLM3, SLM4, SLM5, SLM6, SLM7, SLM8, SLM9, SLM10, SLM11, and SLM12. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for all variables are ranged between (3.01) to (3.59) above the central point value of (3). While the standard deviation of those variables rages between (1.03) to (1.31). This indicates that respondents have a moderate agreement on the strategy measures and majority have a view towards “agree” option, as the mode for most of the variable is (4), except for SLM4 and SLM5 where the mode is scored at (5) which means respondents strongly agree that top management foster a culture that supports innovation and they have clear innovation vision and strategy. In addition, SLM6 mode was the lowest among other variables scored at (3) indicating that the majority have a neutral thoughts of top management ensuring roles and responsibilities are properly assigned and communicated.

The skewness values for all variables are negatively scored ranged between (-.017) and (-.536) resulting in skewness shape towards the neutral and the agreement with the mentioned statements, except for SLM7, SLM9, SLM10, and SLM1 as their skewness values are nearly to the 0, which indicates a deviation in the respondents views with higher values in the disagreement side comparing to other variables in the group.

The distribution of all variables are shown in the figure (A7.17) to (A7.28) and table (A7.17) to (A7.28).

Table 7.4.4: Descriptive Statistics of Strategy Level Measurements

**Statistics**

| | SLM1 | SLM2 | SLM3 | SLM4 | SLM5 | SLM6 | SLM7 | SLM8 | SLM9 | SLM10 | SLM11 | SLM12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 3.51 | 3.59 | 3.48 | 3.53 | 3.42 | 3.53 | 3.23 | 3.51 | 3.16 | 3.22 | 3.01 | 3.43 |
| Median | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 3.00 | 3.00 | 4.00 | 3.00 | 3.00 | 3.00 | 4.00 |
| Mode | 4 | 4 | 4 | 5 | 5 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | 1.131 | 1.092 | 1.036 | 1.279 | 1.317 | 1.153 | 1.120 | 1.108 | 1.103 | 1.184 | 1.068 | 1.129 |
| Skewness | -.344 | -.340 | -.445 | -.374 | -.301 | -.285 | -.017 | -.423 | -.041 | -.098 | -.155 | -.536 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | -.766 | -.728 | -.308 | -1.043 | -1.090 | -.654 | -1.001 | -.436 | -.870 | -1.026 | -.889 | -.306 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 |
| Range | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

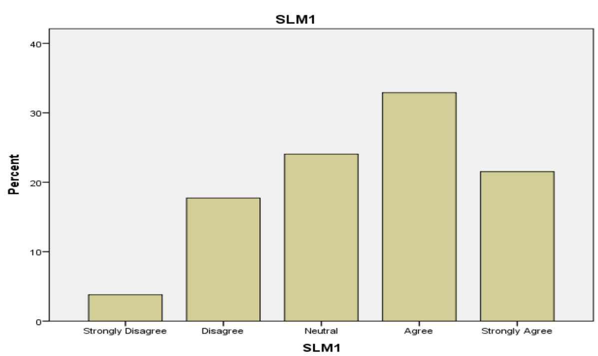



Figure (A7.17) Distribution of strategies are clear enough that we can translate it into innovation initiatives

**SLM1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 14 | 17.7 | 17.7 | 21.5 |
| | Neutral | 19 | 24.1 | 24.1 | 45.6 |
| | Agree | 26 | 32.9 | 32.9 | 78.5 |
| | Strongly Agree | 17 | 21.5 | 21.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.17) Distribution of strategies are clear enough that we can translate it into innovation initiatives

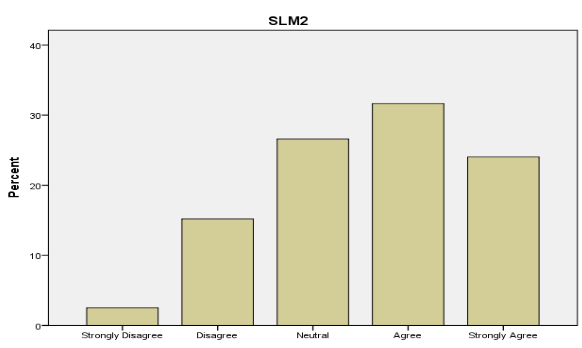



Figure (A7.18) Distribution of strategies match well with the way the market is evolving

**SLM2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Disagree | 12 | 15.2 | 15.2 | 17.7 |
| | Neutral | 21 | 26.6 | 26.6 | 44.3 |
| | Agree | 25 | 31.6 | 31.6 | 75.9 |
| | Strongly Agree | 19 | 24.1 | 24.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.18) Distribution of strategies match well with the way the market is evolving

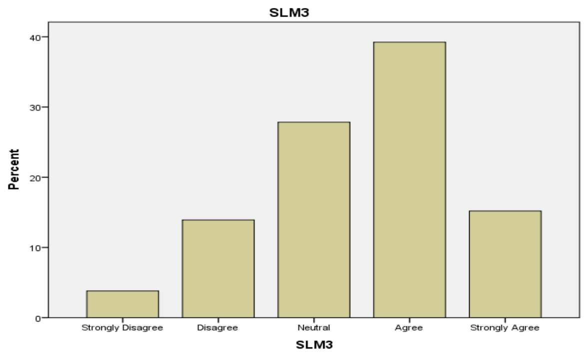



Figure (A7.19) Distribution of approaches exist to ensure ideas are aligned to strategy before implementation

**SLM3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 11 | 13.9 | 13.9 | 17.7 |
| | Neutral | 22 | 27.8 | 27.8 | 45.6 |
| | Agree | 31 | 39.2 | 39.2 | 84.8 |
| | Strongly Agree | 12 | 15.2 | 15.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.19) Distribution of approaches exist to ensure ideas are aligned to strategy before implementation

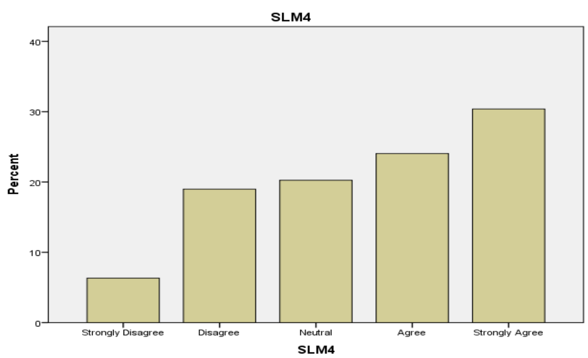



Figure (A7.20) Distribution of top management foster a culture that supports innovation

**SLM4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 5 | 6.3 | 6.3 | 6.3 |
| | Disagree | 15 | 19.0 | 19.0 | 25.3 |
| | Neutral | 16 | 20.3 | 20.3 | 45.6 |
| | Agree | 19 | 24.1 | 24.1 | 69.6 |
| | Strongly Agree | 24 | 30.4 | 30.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.20) Distribution of top management foster a culture that supports innovation

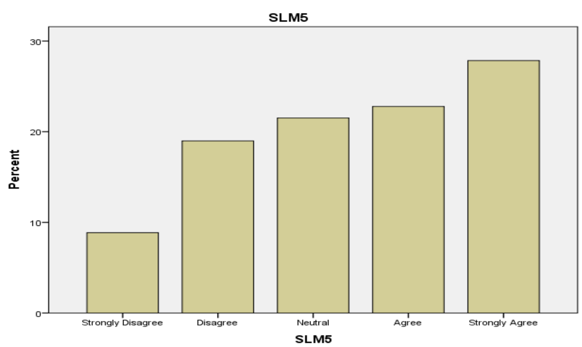



Figure (A7.21) Distribution of top management have a clear innovation vision and strategy

**SLM5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 7 | 8.9 | 8.9 | 8.9 |
| | Disagree | 15 | 19.0 | 19.0 | 27.8 |
| | Neutral | 17 | 21.5 | 21.5 | 49.4 |
| | Agree | 18 | 22.8 | 22.8 | 72.2 |
| | Strongly Agree | 22 | 27.8 | 27.8 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.21) Distribution of top management have a clear innovation vision and strategy

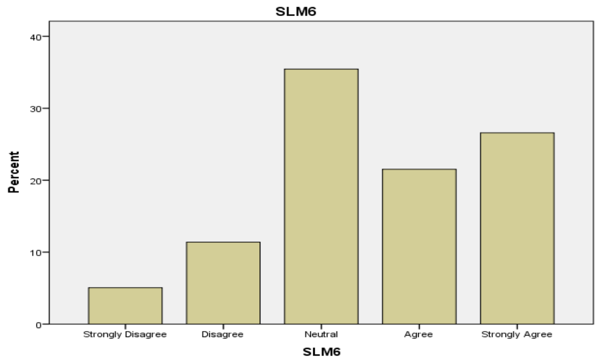



Figure (A7.22) Distribution of top management ensure that roles and responsibilities are properly assigned and communicated

**SLM6**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Disagree | 9 | 11.4 | 11.4 | 16.5 |
| | Neutral | 28 | 35.4 | 35.4 | 51.9 |
| | Agree | 17 | 21.5 | 21.5 | 73.4 |
| | Strongly Agree | 21 | 26.6 | 26.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.22) Distribution of top management ensure that roles and responsibilities are properly assigned and communicated

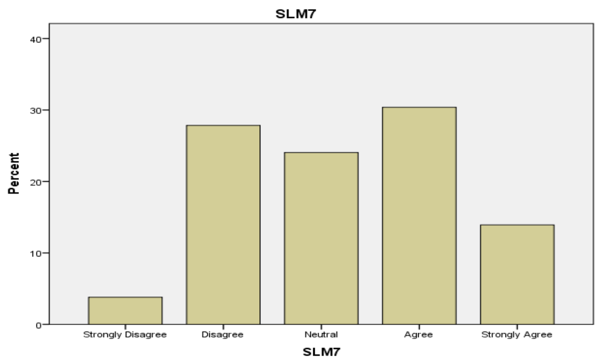



Figure (A7.23) Distribution of innovation objectives exist at relevant functions and levels, which are consistent with the innovation vision and strategy

**SLM7**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 22 | 27.8 | 27.8 | 31.6 |
| | Neutral | 19 | 24.1 | 24.1 | 55.7 |
| | Agree | 24 | 30.4 | 30.4 | 86.1 |
| | Strongly Agree | 11 | 13.9 | 13.9 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.23) Distribution of innovation objectives exist at relevant functions and levels, which are consistent with the innovation vision and strategy

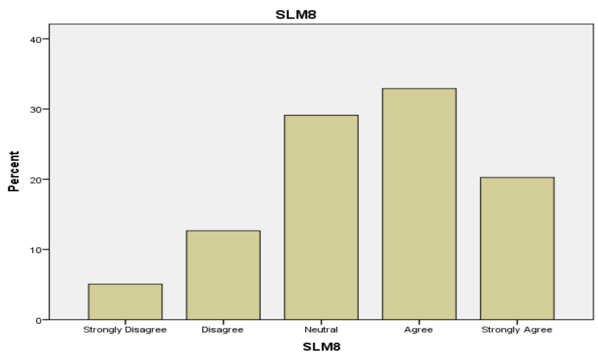



Figure (A7.24) Distribution of team members are free to bring ideas forward, regardless of their formal position

**SLM8**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Disagree | 10 | 12.7 | 12.7 | 17.7 |
| | Neutral | 23 | 29.1 | 29.1 | 46.8 |
| | Agree | 26 | 32.9 | 32.9 | 79.7 |
| | Strongly Agree | 16 | 20.3 | 20.3 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.24) Distribution of team members are free to bring ideas forward, regardless of their formal position

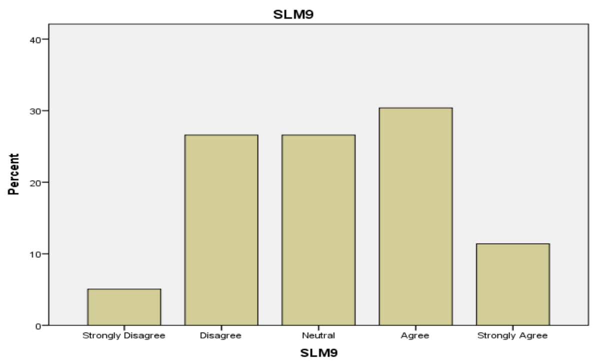



Figure (A7.25) Distribution of innovation process consists of structured and clear methods to develop new ideas and transform them into innovation value with the quality and timelines to achieve the results

**SLM9**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Disagree | 21 | 26.6 | 26.6 | 31.6 |
| | Neutral | 21 | 26.6 | 26.6 | 58.2 |
| | Agree | 24 | 30.4 | 30.4 | 88.6 |
| | Strongly Agree | 9 | 11.4 | 11.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.25) Distribution of innovation process consists of structured and clear methods to develop new ideas and transform them into innovation value with the quality and timelines to achieve the results

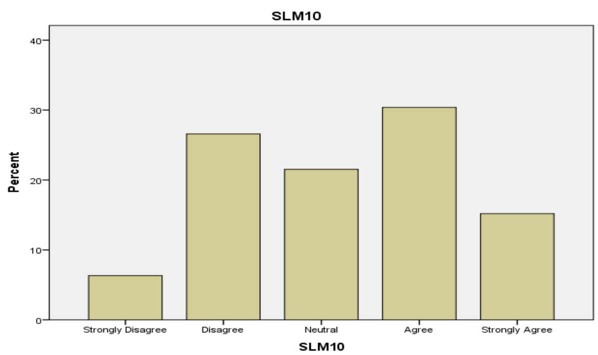



Figure (A7.26) Distribution of innovation-specific recognition and reward systems are established

**SLM10**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 5 | 6.3 | 6.3 | 6.3 |
| | Disagree | 21 | 26.6 | 26.6 | 32.9 |
| | Neutral | 17 | 21.5 | 21.5 | 54.4 |
| | Agree | 24 | 30.4 | 30.4 | 84.8 |
| | Strongly Agree | 12 | 15.2 | 15.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.26) Distribution of innovation-specific recognition and reward systems are established

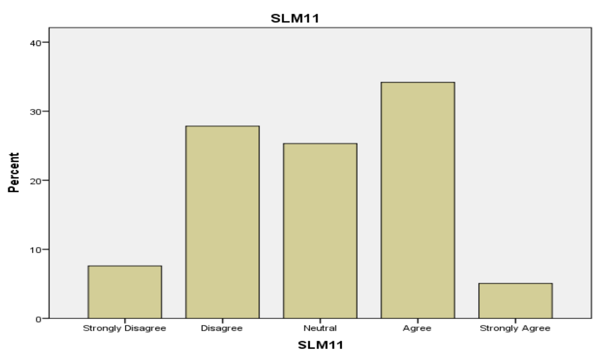



Figure (A7.27) Distribution of there is a strong diffusion network between the opinion-leader and the change agent influences innovation decisions

**SLM11**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 6 | 7.6 | 7.6 | 7.6 |
| | Disagree | 22 | 27.8 | 27.8 | 35.4 |
| | Neutral | 20 | 25.3 | 25.3 | 60.8 |
| | Agree | 27 | 34.2 | 34.2 | 94.9 |
| | Strongly Agree | 4 | 5.1 | 5.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.27) Distribution of there is a strong diffusion network between the opinion-leader and the change agent influences innovation decisions

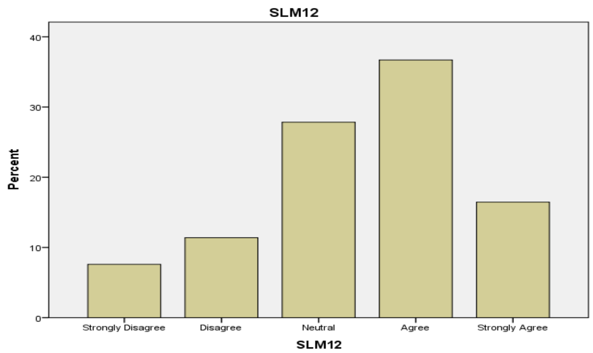



Figure (A7.28) Distribution of information about successful ideas is shared within the organisation and among the strategic partners

**SLM12**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 6 | 7.6 | 7.6 | 7.6 |
| | Disagree | 9 | 11.4 | 11.4 | 19.0 |
| | Neutral | 22 | 27.8 | 27.8 | 46.8 |
| | Agree | 29 | 36.7 | 36.7 | 83.5 |
| | Strongly Agree | 13 | 16.5 | 16.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.28) Distribution of information about successful ideas is shared within the organisation and among the strategic partners

### 7.4.5. Government Council Level Measurements (GCLM)

Table (7.4.5) provides descriptive statistics of the government council level measurements plotted according to the number of respondents. This category of innovation performance measurements factor comprises five variables which are: GCLM1, GCLM2, GCLM3, GCLM4, and GCLM5. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for GCLM1 "Our innovation project has successfully addressed an important problem of public concern in the government sector" is (3.59), above the neutral value of (3) and has standard deviation of (1.104). Similarly, GCLM2 "Our innovation project, or aspects of it, has shown promise of being spread or replicated by other government entities" has a mean value of (3.52) and standard deviation of (1.011). Also, GCLM4 "Projects and programs are related to the objectives and goals of the government strategy and achieve economic value on the national level" has a mean value of (3.75) and standard deviation of (1.056). GCLM5 "Information about successful ideas is shared with other governments" has a mean value of (3.59) and standard deviation of (1.127). Therefore, it is noticed that respondents views where almost similar in those variables with moderate agreement toward the "agree" option as the majority of values fall in column (4). In addition, the values are negatively skewed scored at (-.540), (-.359), (-.611), and (-.463) respectively, this indicates that the majority of the respondents towards the view of agreeing with the statements concerning the government sector addressing and supporting the innovation projects for the sake of public benefits.

Whereas, the mean for GCLM3 "Diffusion of innovation strategy has added value, saved costs and generated new revenues across the government departments" is (3.48), and has standard deviation of (1.084). This variable has the lowest value of skewness among other variables in the group scored at (-.259) which indicates less agreement by respondents on the value added of innovation strategy diffusion in terms of saving costs and generating new revenues, as shown in figure (A7.31).

The distribution of all variables are shown in the figure (A7.29) to (A7.33) and table (A7.29) to (A7.33).

Table 7.4.5: Descriptive Statistics of Government's Council Level Measurements

**Statistics**

| | GCLM1 | GCLM2 | GCLM3 | GCLM4 | GCLM5 |
|---|---|---|---|---|---|
| Mean | 3.59 | 3.52 | 3.48 | 3.75 | 3.59 |
| Median | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | 1.104 | 1.011 | 1.084 | 1.056 | 1.127 |
| Skewness | -.540 | -.359 | -.259 | -.611 | -.463 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | -.482 | -.403 | -.808 | -.278 | -.622 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 |
| Range | 4 | 4 | 4 | 4 | 4 |

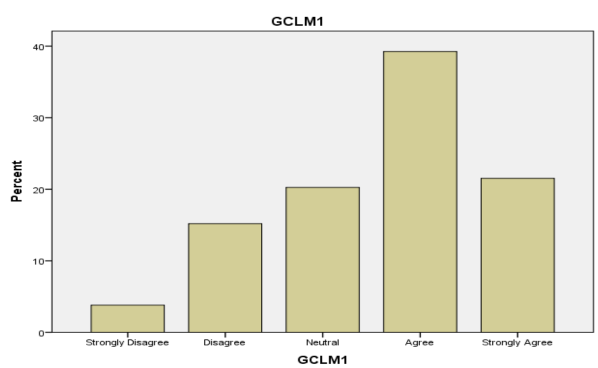



Figure (A7.29) Distribution of our innovation project has successfully addressed an important problem of public concern in the government sector

**GCLM1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 12 | 15.2 | 15.2 | 19.0 |
| | Neutral | 16 | 20.3 | 20.3 | 39.2 |
| | Agree | 31 | 39.2 | 39.2 | 78.5 |
| | Strongly Agree | 17 | 21.5 | 21.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.29) Distribution of our innovation project has successfully addressed an important problem of public concern in the government sector

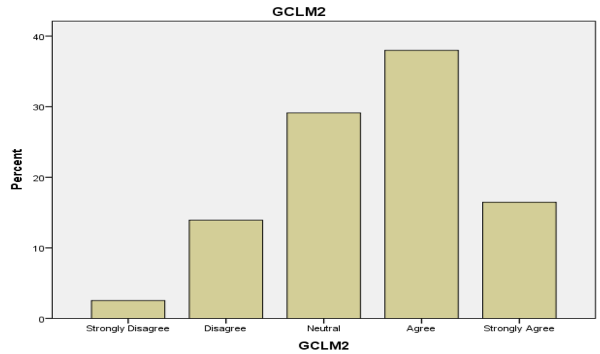



Figure (A7.30) Distribution of our innovation project, or aspects of it, has shown promise of being spread or replicated by other government entities

**GCLM2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Disagree | 11 | 13.9 | 13.9 | 16.5 |
| | Neutral | 23 | 29.1 | 29.1 | 45.6 |
| | Agree | 30 | 38.0 | 38.0 | 83.5 |
| | Strongly Agree | 13 | 16.5 | 16.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.30) Distribution of our innovation project, or aspects of it, has shown promise of being spread or replicated by other government entities

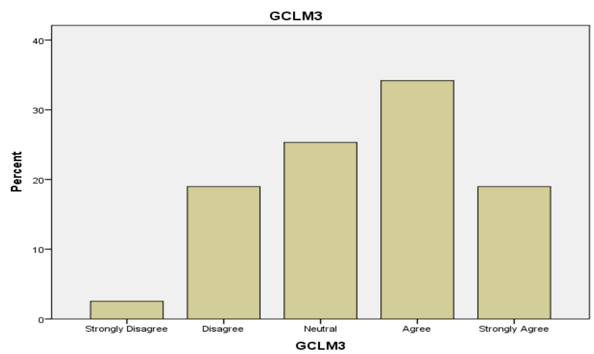



Figure (A7.31) Distribution of diffusion of innovation strategy has added value, saved costs and generated new revenues across the government departments

**GCLM3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Disagree | 15 | 19.0 | 19.0 | 21.5 |
| | Neutral | 20 | 25.3 | 25.3 | 46.8 |
| | Agree | 27 | 34.2 | 34.2 | 81.0 |
| | Strongly Agree | 15 | 19.0 | 19.0 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.31) Distribution of diffusion of innovation strategy has added value, saved costs and generated new revenues across the government departments

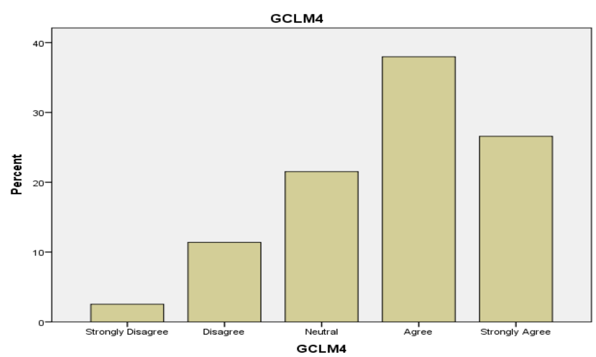



Figure (A7.32) Distribution of projects and programs are related to the objectives and goals of the government strategy and achieve economic value on the national level

**GCLM4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Disagree | 9 | 11.4 | 11.4 | 13.9 |
| | Neutral | 17 | 21.5 | 21.5 | 35.4 |
| | Agree | 30 | 38.0 | 38.0 | 73.4 |
| | Strongly Agree | 21 | 26.6 | 26.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.32) Distribution of projects and programs are related to the objectives and goals of the government strategy and achieve economic value on the national level

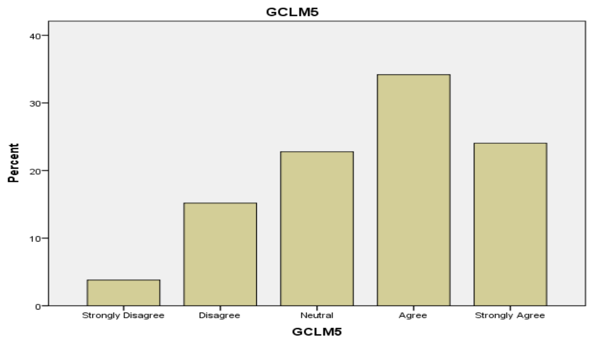



Figure (A7.33) Distribution of information about successful ideas is shared with other governments

**GCLM5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 12 | 15.2 | 15.2 | 19.0 |
| | Neutral | 18 | 22.8 | 22.8 | 41.8 |
| | Agree | 27 | 34.2 | 34.2 | 75.9 |
| | Strongly Agree | 19 | 24.1 | 24.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.33) Distribution of information about successful ideas is shared with other governments

### 7.4.6. Knowledge Stage Skills (KSS)

Table (7.4.6) provides descriptive statistics of the knowledge stage skills plotted according to the number of respondents. This category of innovation skills factor comprises fifteen variables which are: KSS1, KSS2, KSS3, KSS4, KSS5, KSS6, KSS7, KSS8, KSS9, KSS10, KSS11, KSS12, KSS13, KSS14, and KSS15. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for all variables are above the value of (4) except for KSS3 valued at (3.78), so they range between (4.03) to (4.52) above the central point value of (3). While the standard deviation of those variables range between (.618) to (.970). This indicates that respondents have a good agreement on the statements related to the innovation skills at knowledge stage and majority of them have a view towards “agree” and “strongly agree” option, as the median and the mode for most of the variable is scored at (4) and sometime (5).

As shown in table (7.5.6), the skewness values for all variables are negatively scored and they ranged between (-.415) and (-1.290) resulting in skewness shape often peaked towards the “agree” and “strongly agree” which indicates an agreement among the majority of respondents’ views with almost all variables in the group.

The distribution of all variables are shown in the figure (A7.34) to (A7.48) and table (A7.34) to (A7.48).

Table 7.4.6: Descriptive Statistics of Knowledge Stage Skills

**Statistics**

| | KSS1 | KSS2 | KSS3 | KSS4 | KSS5 | KSS6 | KSS7 | KSS8 | KSS9 | KSS10 | KSS11 | KSS12 | KSS13 | KSS14 | KSS15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 4.48 | 4.52 | 3.78 | 4.06 | 4.18 | 4.30 | 4.03 | 4.09 | 4.06 | 4.37 | 4.27 | 4.16 | 4.19 | 4.49 | 4.39 |
| Median | 5.00 | 5.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 5.00 | 4.00 |
| Mode | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| Std. Deviation | .695 | .638 | .970 | .965 | .874 | .774 | .751 | .804 | .822 | .624 | .746 | .758 | .802 | .618 | .629 |
| Variance | .484 | .407 | .940 | .932 | .763 | .599 | .563 | .646 | .675 | .389 | .557 | .575 | .643 | .381 | .395 |
| Skewness | -1.221 | -1.290 | -.503 | -1.006 | -.830 | -.931 | -.415 | -.772 | -.830 | -.452 | -.859 | -.467 | -.819 | -1.148 | -.851 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | 1.113 | 1.971 | -.262 | .591 | -.062 | .406 | -.102 | 1.243 | .541 | -.626 | .591 | -.530 | .312 | 1.966 | 1.299 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 |
| Range | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 4 | 3 | 2 | 3 | 3 | 3 | 3 | 3 |

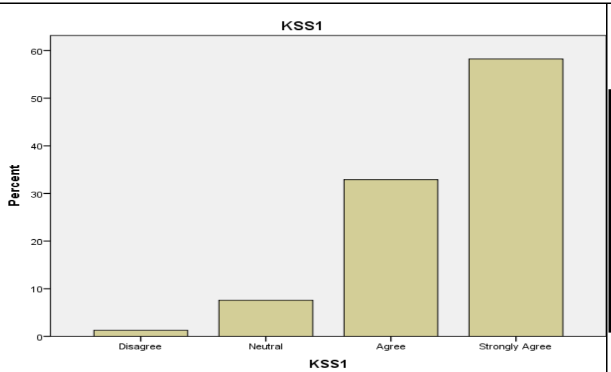



Figure (A7.34) Distribution of creativity can be fostered by removing barriers to knowledge-sharing

**KSS1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 6 | 7.6 | 7.6 | 8.9 |
| | Agree | 26 | 32.9 | 32.9 | 41.8 |
| | Strongly Agree | 46 | 58.2 | 58.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.34) Distribution of creativity can be fostered by removing barriers to knowledge-sharing

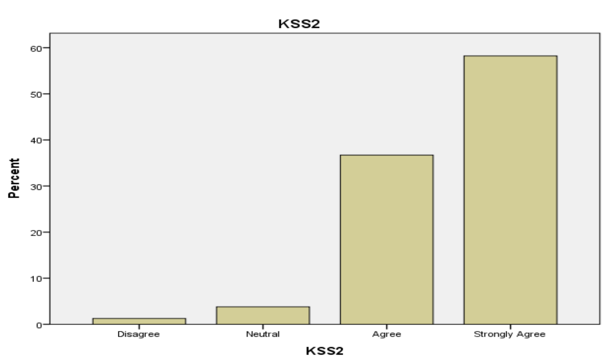



Figure (A7.35) Distribution of idea formation skill helps individuals to generate innovative ideas

**KSS2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 3 | 3.8 | 3.8 | 5.1 |
| | Agree | 29 | 36.7 | 36.7 | 41.8 |
| | Strongly Agree | 46 | 58.2 | 58.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.35) Distribution of idea formation skill helps individuals to generate innovative ideas

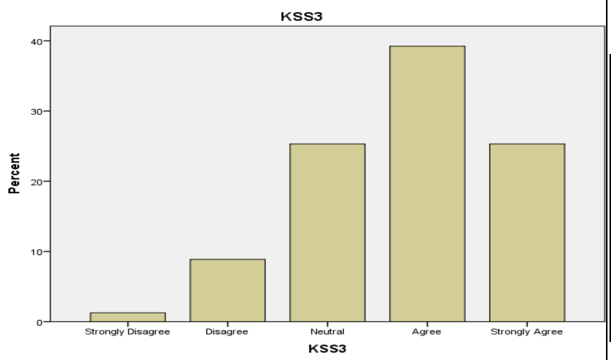



Figure (A7.36) Distribution of evaluating ideas is based on a predetermined cost-benefit analysis

**KSS3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 7 | 8.9 | 8.9 | 10.1 |
| | Neutral | 20 | 25.3 | 25.3 | 35.4 |
| | Agree | 31 | 39.2 | 39.2 | 74.7 |
| | Strongly Agree | 20 | 25.3 | 25.3 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.36) Distribution of evaluating ideas is based on a predetermined cost-benefit analysis

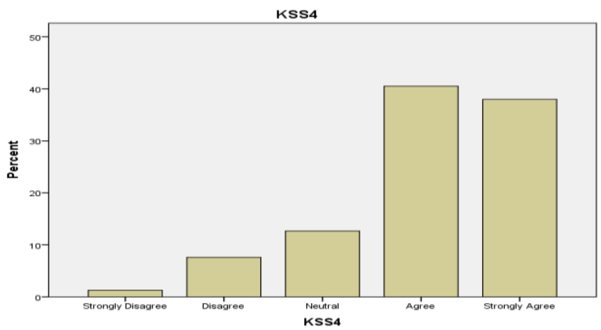



Figure (A7.37) Distribution of problem solving is approached from innovation perspective

**KSS4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 6 | 7.6 | 7.6 | 8.9 |
| | Neutral | 10 | 12.7 | 12.7 | 21.5 |
| | Agree | 32 | 40.5 | 40.5 | 62.0 |
| | Strongly Agree | 30 | 38.0 | 38.0 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.37) Distribution of problem solving is approached from innovation perspective

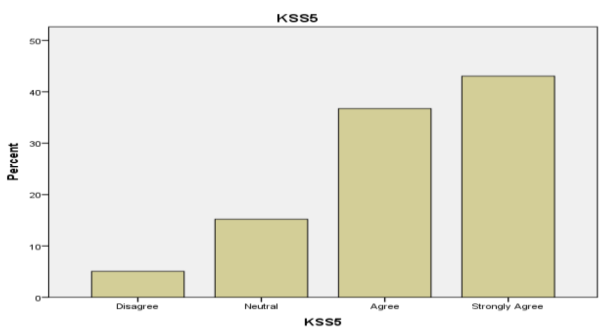



Figure (A7.38) Distribution of curiosity is a prerequisite for knowledge searching

**KSS5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Neutral | 12 | 15.2 | 15.2 | 20.3 |
| | Agree | 29 | 36.7 | 36.7 | 57.0 |
| | Strongly Agree | 34 | 43.0 | 43.0 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.38) Distribution of curiosity is a prerequisite for knowledge searching

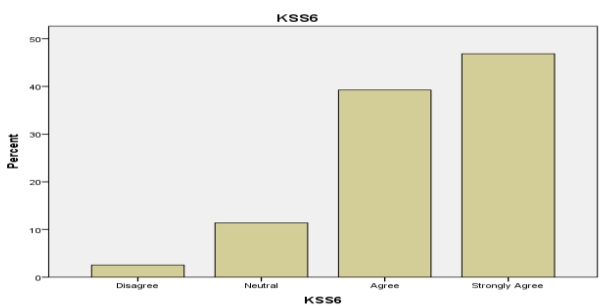



Figure (A7.39) Distribution of insights drive individuals to seek realistic improvement opportunities

**KSS6**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 9 | 11.4 | 11.4 | 13.9 |
| | Agree | 31 | 39.2 | 39.2 | 53.2 |
| | Strongly Agree | 37 | 46.8 | 46.8 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.39) Distribution of insights drive individuals to seek realistic improvement opportunities

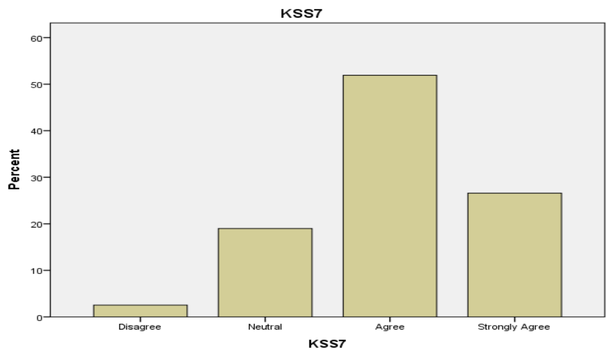



Figure (A7.40) Distribution of inquisitiveness for opportunity catalyzes the acquisition of awareness knowledge

**KSS7**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 15 | 19.0 | 19.0 | 21.5 |
| | Agree | 41 | 51.9 | 51.9 | 73.4 |
| | Strongly Agree | 21 | 26.6 | 26.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.40) Distribution of inquisitiveness for opportunity catalyzes the acquisition of awareness knowledge

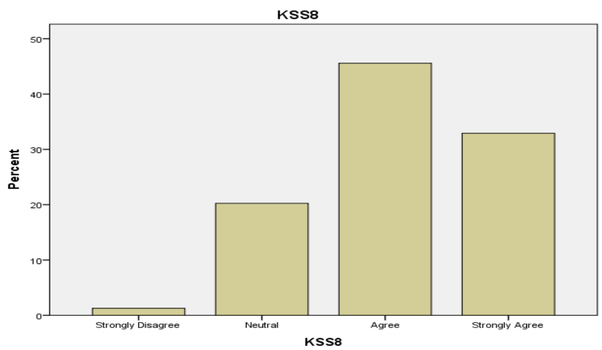



Figure (A7.41) Distribution of inquisitiveness for opportunity builds resourcefulness for knowledge modification and application

**KSS8**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 16 | 20.3 | 20.3 | 21.5 |
| | Agree | 36 | 45.6 | 45.6 | 67.1 |
| | Strongly Agree | 26 | 32.9 | 32.9 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.41) Distribution of inquisitiveness for opportunity builds resourcefulness for knowledge modification and application

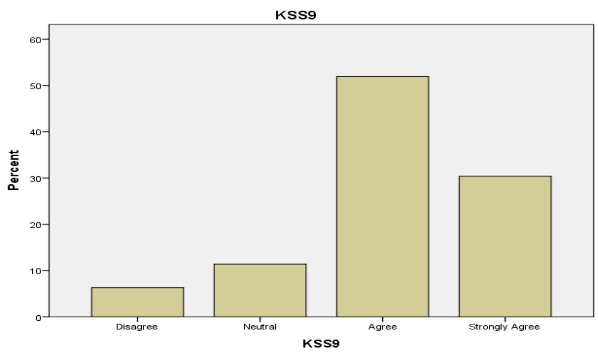



Figure (A7.42) Distribution of adventure in trying out new approaches facilitates knowledge-search

**KSS9**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 5 | 6.3 | 6.3 | 6.3 |
| | Neutral | 9 | 11.4 | 11.4 | 17.7 |
| | Agree | 41 | 51.9 | 51.9 | 69.6 |
| | Strongly Agree | 24 | 30.4 | 30.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.42) Distribution of adventure in trying out new approaches facilitates knowledge-search

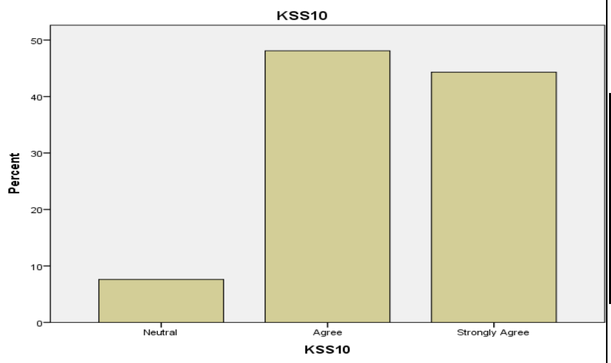



Figure (A7.43) Distribution of openness to new approaches expands opportunities

**KSS10**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Neutral | 6 | 7.6 | 7.6 | 7.6 |
| | Agree | 38 | 48.1 | 48.1 | 55.7 |
| | Strongly Agree | 35 | 44.3 | 44.3 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.43) Distribution of openness to new approaches expands opportunities

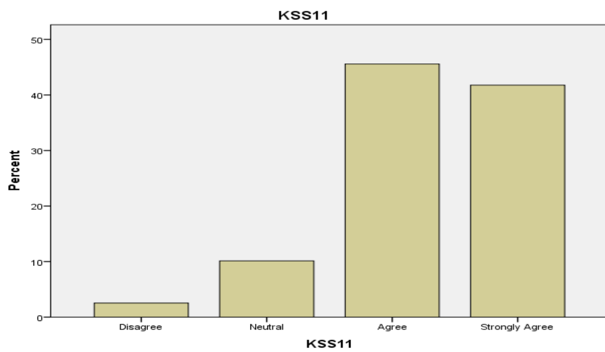



Figure (A7.44) Distribution of ability to explore new ventures catalyzes the creation of knowledge

**KSS11**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 8 | 10.1 | 10.1 | 12.7 |
| | Agree | 36 | 45.6 | 45.6 | 58.2 |
| | Strongly Agree | 33 | 41.8 | 41.8 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.44) Distribution of ability to explore new ventures catalyzes the creation of knowledge

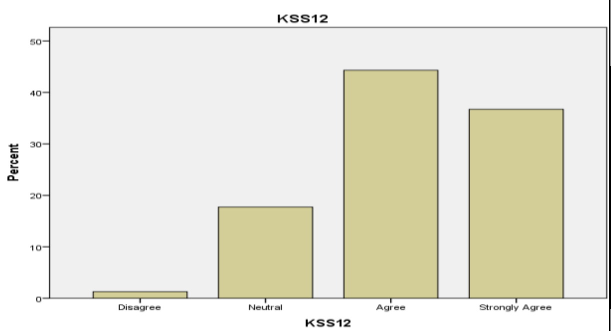



Figure (A7.45) Distribution of the capacity to explore ideas catalyzes problem-solving

**KSS12**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 14 | 17.7 | 17.7 | 19.0 |
| | Agree | 35 | 44.3 | 44.3 | 63.3 |
| | Strongly Agree | 29 | 36.7 | 36.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.45) Distribution of the capacity to explore ideas catalyzes problem-solving

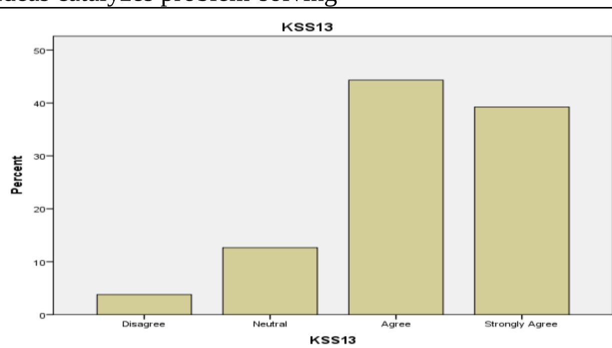
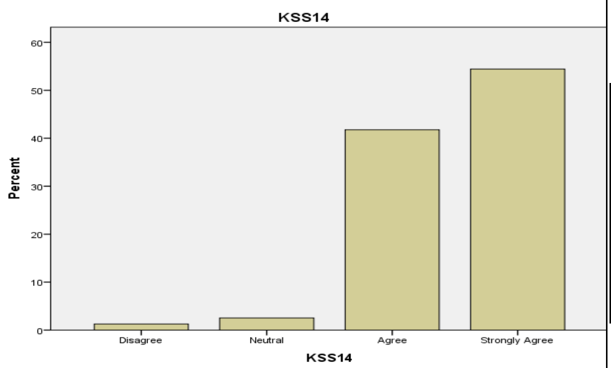



Figure (A7.46) Distribution of teamwork fosters risk-sharing leading to better generation of ideas

**KSS13**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Neutral | 10 | 12.7 | 12.7 | 16.5 |
| | Agree | 35 | 44.3 | 44.3 | 60.8 |
| | Strongly Agree | 31 | 39.2 | 39.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.46) Distribution of teamwork fosters risk-sharing leading to better generation of ideas

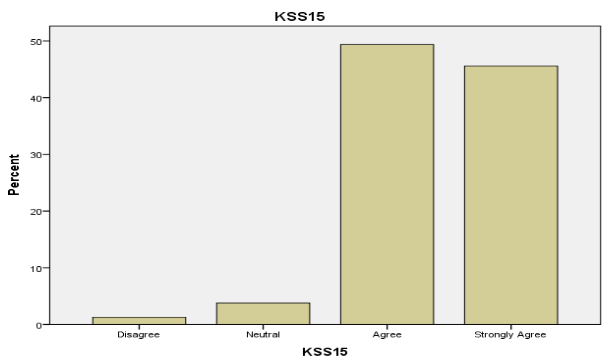



**KSS14**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 2 | 2.5 | 2.5 | 3.8 |
| | Agree | 33 | 41.8 | 41.8 | 45.6 |
| | Strongly Agree | 43 | 54.4 | 54.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.47) Distribution of communication improves knowledge sharing and diffusion

Table (A7.47) Distribution of communication improves knowledge sharing and diffusion




**KSS15**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 3 | 3.8 | 3.8 | 5.1 |
| | Agree | 39 | 49.4 | 49.4 | 54.4 |
| | Strongly Agree | 36 | 45.6 | 45.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.48) Distribution of continuous improvement facilitates knowledge improvement

Table (A7.48) Distribution of continuous improvement facilitates knowledge improvement

### 7.4.7. Persuasion Stage Skills (PSS)

Table (7.4.7) provides descriptive statistics of the persuasion stage skills plotted according to the number of respondents. This category of innovation skills factor comprises fifteen variables which are: PSS1, PSS2, PSS3, PSS4, PSS5, PSS6, PSS7, PSS8, PSS9, PSS10, PSS11, PSS12, and PSS13. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for all variables are above the value of (4), and they range between (4.04) to (4.35) above the central point value of (3). While the standard deviation of those variables range between (.618) to (.970). This indicates that respondents have a strong agreement on the statements related to the innovation skills at persuasion stage and majority of them have a view towards "agree" and "strongly agree" option, as the median for all variables scored at (4) except PSS7 scored (5) and the mode for the variable is scored at (4) except for PSS7 and PSS9 scored at (5).

Particularly, PSS7 "Communication skills improve the efficacy of the information-search process" and PSS9 "An entrepreneurial mindset induces the individual to focus on the possibilities not the challenge" reached to almost 50% where the respondents strongly agree with the statements comparing to other statements.

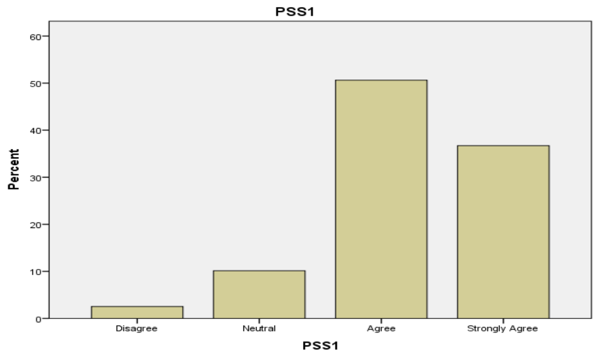
As shown in table (7.5.7), the skewness values for all variables are negatively scored and they range between (-.255) and (-1.34) resulting in skewness shape often peaked towards the "agree" and "strongly agree" which indicates an agreement among the majority of respondents' views with almost all variables in the group.

The distribution of all variables are shown in the figure (A7.49) to (A7.61) and table (A7.49) to (A7.61).

Table 7.4.7: Descriptive Statistics of Persuasion Stage Skills

**Statistics**

| | PSS1 | PSS2 | PSS3 | PSS4 | PSS5 | PSS6 | PSS7 | PSS8 | PSS9 | PSS10 | PSS11 | PSS12 | PSS13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 4.22 | 4.06 | 4.05 | 4.09 | 4.13 | 4.04 | 4.35 | 4.09 | 4.09 | 4.20 | 4.20 | 4.24 | 4.11 |
| Median | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 5.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 4 |
| Std. Deviation | .728 | .837 | .766 | .788 | .790 | .808 | .801 | .894 | 1.028 | .723 | .668 | .683 | .784 |
| Variance | .530 | .701 | .587 | .620 | .625 | .652 | .642 | .800 | 1.056 | .523 | .446 | .467 | .615 |
| Skewness | -.766 | -1.062 | -.964 | -.482 | -1.190 | -.669 | -1.349 | -1.170 | -1.272 | -1.164 | -.255 | -.593 | -.532 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | .661 | 1.774 | 2.342 | -.345 | 2.695 | .220 | 1.712 | 1.527 | 1.453 | 3.620 | -.749 | .304 | -.259 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 |
| Range | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 2 | 3 | 3 |

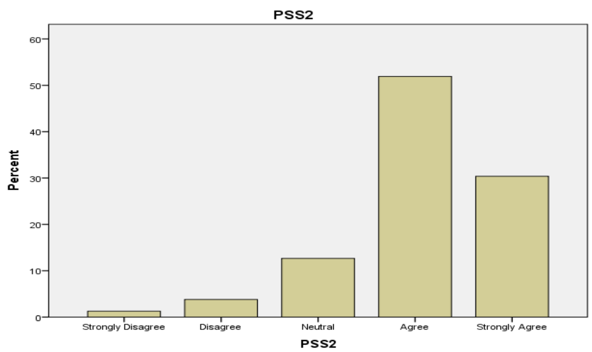



**PSS1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 8 | 10.1 | 10.1 | 12.7 |
| | Agree | 40 | 50.6 | 50.6 | 63.3 |
| | Strongly Agree | 29 | 36.7 | 36.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.49) Distribution of the presence of relationship skills facilitates the individual to search for feedback from multiple stakeholders

Table (A7.49) Distribution of the presence of relationship skills facilitates the individual to search for feedback from multiple stakeholders

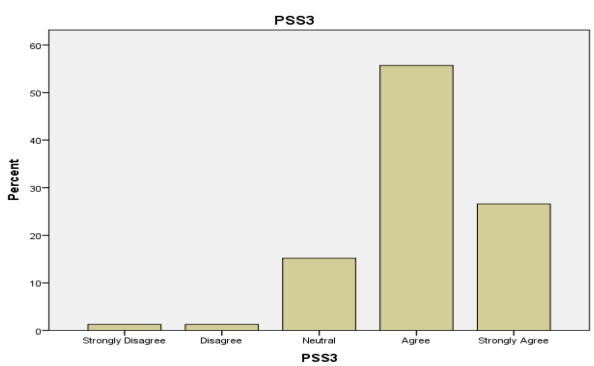



**PSS2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 3 | 3.8 | 3.8 | 5.1 |
| | Neutral | 10 | 12.7 | 12.7 | 17.7 |
| | Agree | 41 | 51.9 | 51.9 | 69.6 |
| | Strongly Agree | 24 | 30.4 | 30.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.50) Distribution of persuasion skill helps individual to assess the innovative idea using enabler factors

Table (A7.50) Distribution of persuasion skill helps individual to assess the innovative idea using enabler factors



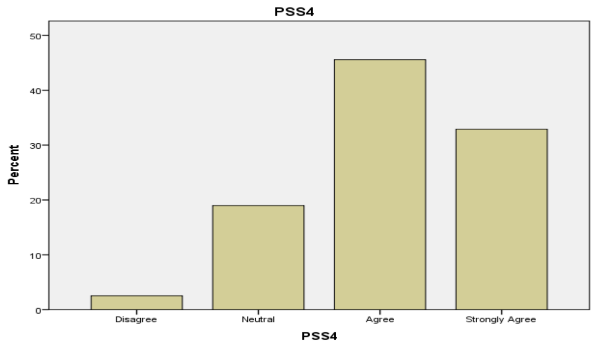

**PSS3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 1 | 1.3 | 1.3 | 2.5 |
| | Neutral | 12 | 15.2 | 15.2 | 17.7 |
| | Agree | 44 | 55.7 | 55.7 | 73.4 |
| | Strongly Agree | 21 | 26.6 | 26.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.51) Distribution of persuasion skill improves individual ability to build new idea based on accurate information

Table (A7.51) Distribution of persuasion skill improves individual ability to build new idea based on accurate information

PSS4

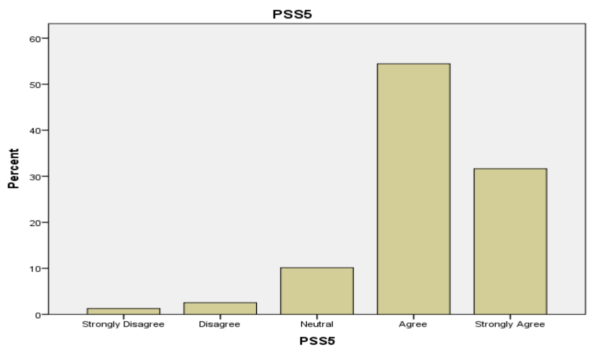



| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 15 | 19.0 | 19.0 | 21.5 |
| | Agree | 36 | 45.6 | 45.6 | 67.1 |
| | Strongly Agree | 26 | 32.9 | 32.9 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.52) Distribution of collaboration helps the individual to better understand the innovative idea

Table (A7.52) Distribution of collaboration helps the individual to better understand the innovative idea

PSS5

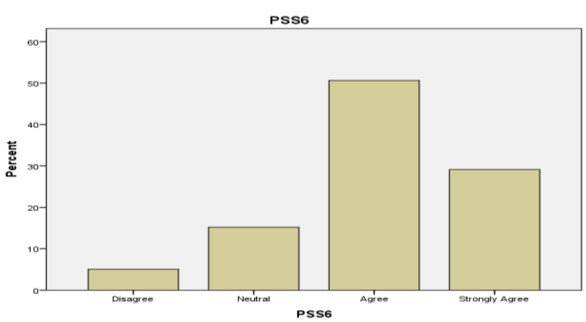



| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 2 | 2.5 | 2.5 | 3.8 |
| | Neutral | 8 | 10.1 | 10.1 | 13.9 |
| | Agree | 43 | 54.4 | 54.4 | 68.4 |
| | Strongly Agree | 25 | 31.6 | 31.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.53) Distribution of a pursue of team approach to information search, returns a richer variety of ideas

Table (A7.53) Distribution of a pursue of team approach to information search, returns a richer variety of ideas

PSS6

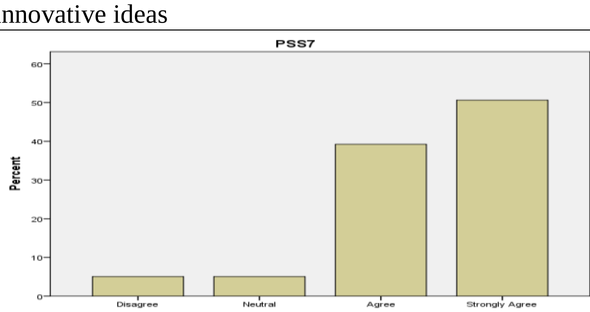



| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Neutral | 12 | 15.2 | 15.2 | 20.3 |
| | Agree | 40 | 50.6 | 50.6 | 70.9 |
| | Strongly Agree | 23 | 29.1 | 29.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.54) Distribution of problem solving skills enable the individual to persevere in searching for innovative ideas

Table (A7.54) Distribution of problem solving skills enable the individual to persevere in searching for innovative ideas

PSS7




| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Neutral | 4 | 5.1 | 5.1 | 10.1 |
| | Agree | 31 | 39.2 | 39.2 | 49.4 |
| | Strongly Agree | 40 | 50.6 | 50.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.55) Distribution of communication skills improve the efficacy of the information-search process

Table (A7.55) Distribution of communication skills improve the efficacy of the information-search process

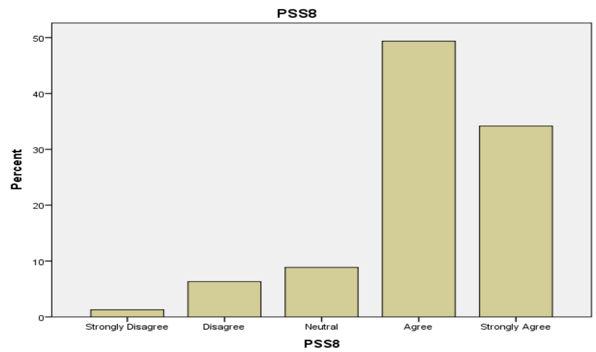



Figure (A7.56) Distribution of multi-cultural competence enables the individual to follow information from different cultural contexts

**PSS8**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 5 | 6.3 | 6.3 | 7.6 |
| | Neutral | 7 | 8.9 | 8.9 | 16.5 |
| | Agree | 39 | 49.4 | 49.4 | 65.8 |
| | Strongly Agree | 27 | 34.2 | 34.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.56) Distribution of multi-cultural competence enables the individual to follow information from different cultural contexts

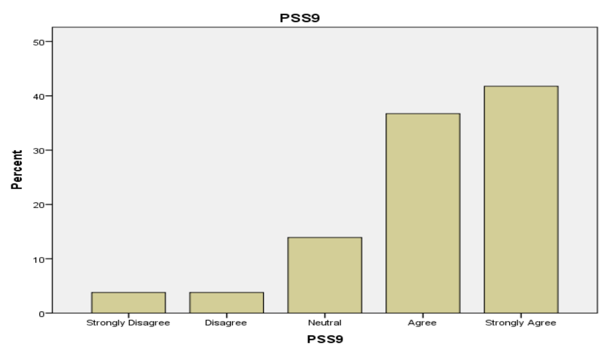



Figure (A7.57) Distribution of an entrepreneurial mindset induces the individual to focus on the possibilities not the challenge

**PSS9**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Disagree | 3 | 3.8 | 3.8 | 7.6 |
| | Neutral | 11 | 13.9 | 13.9 | 21.5 |
| | Agree | 29 | 36.7 | 36.7 | 58.2 |
| | Strongly Agree | 33 | 41.8 | 41.8 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.57) Distribution of an entrepreneurial mindset induces the individual to focus on the possibilities not the challenge

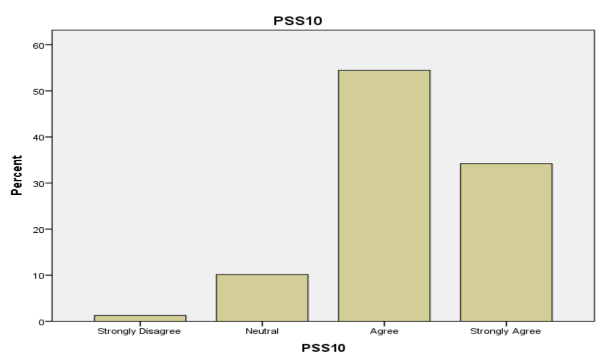
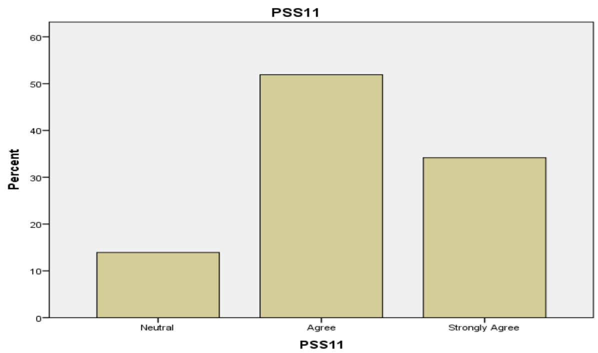



Figure (A7.58) Distribution of sociability creates a more welcoming environment for individuals with information to share

**PSS10**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 8 | 10.1 | 10.1 | 11.4 |
| | Agree | 43 | 54.4 | 54.4 | 65.8 |
| | Strongly Agree | 27 | 34.2 | 34.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.58) Distribution of sociability creates a more welcoming environment for individuals with information to share

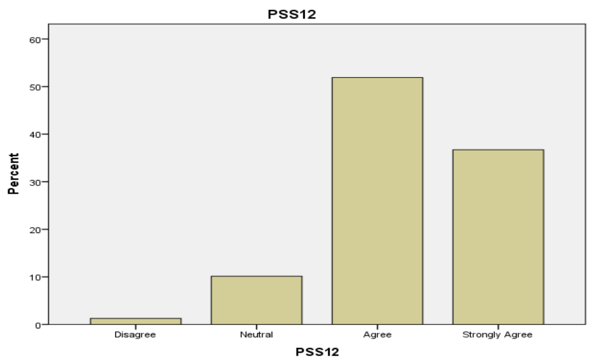



**PSS11**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Neutral | 11 | 13.9 | 13.9 | 13.9 |
| | Agree | 41 | 51.9 | 51.9 | 65.8 |
| | Strongly Agree | 27 | 34.2 | 34.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.59) Distribution of problem visualization can empower individuals to pursue on innovative ideas

Table (A7.59) Distribution of Problem visualization can empower individuals to pursue on innovative ideas

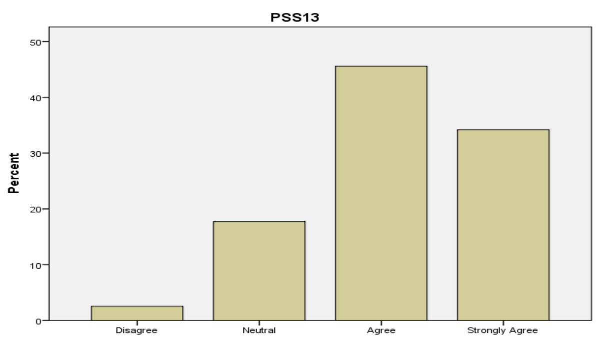



**PSS12**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 8 | 10.1 | 10.1 | 11.4 |
| | Agree | 41 | 51.9 | 51.9 | 63.3 |
| | Strongly Agree | 29 | 36.7 | 36.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.60) Distribution of lateral thinking makes the individual more resourceful with the available information

Table (A7.60) Distribution of lateral thinking makes the individual more resourceful with the available information




**PSS13**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 14 | 17.7 | 17.7 | 20.3 |
| | Agree | 36 | 45.6 | 45.6 | 65.8 |
| | Strongly Agree | 27 | 34.2 | 34.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.61) Distribution of lateral thinking makes the individual more likely to pursue innovative ideas because they can think beyond the obstacles

Table (A7.61) Distribution of lateral thinking makes the individual more likely to pursue innovative ideas because they can think beyond the obstacles

### 7.4.8. Decision Stage Skills (DSS)

Table (7.4.8) provides descriptive statistics of the decision stage skills plotted according to the number of respondents. This category of innovation skills factor comprises fifteen variables which are: DSS1, DSS2, DSS3, DSS4, DSS5, DSS6, DSS7, DSS8, DSS9, DSS10, DSS11, DSS12, and DSS13. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for all variables are above the value of (4), and they range between (4.01) to (4.35) above the central point value of (3). While the standard deviation of those variables range between (.619) to (.940). This indicates that respondents have a strong agreement on the statements related to the innovation skills at decision stage and majority of them have a view towards "agree" and "strongly agree" option, as the median for all variables scored at (4) except DSS1 and DSS7 scored (5) and the mode for the variable is scored at (4) except for DSS1, DSS6 and DSS7 scored at (5).

Particularly, DSS1 "Understanding the risks associated with innovative idea increases the chance of adopting the idea" and DSS7 "Decision-making power facilitates adoption of new ideas" reached to almost 50% where the respondents strongly agree with the statements comparing to other statements.

As shown in table (7.5.8), the skewness values for all variables are negatively scored and they range between (-.429) and (-1.135) resulting in skewness shape often peaked towards the "agree" and "strongly agree" which indicates an agreement among the majority of respondents' views with almost all variables in the group.

The distribution of all variables are shown in the figure (A7.62) to (A7.74) and table (A7.62) to (A7.74).

Table 7.4.8: Descriptive Statistics of Decision Stage Skills

**Statistics**

| | DSS1 | DSS2 | DSS3 | DSS4 | DSS5 | DSS6 | DSS7 | DSS8 | DSS9 | DSS10 | DSS11 | DSS12 | DSS13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 4.23 | 4.22 | 4.23 | 4.16 | 4.08 | 4.24 | 4.35 | 4.16 | 4.09 | 4.15 | 4.23 | 4.01 | 4.14 |
| Median | 5.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 5.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | 5 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | .933 | .762 | .697 | .940 | .888 | .851 | .848 | .775 | .737 | .769 | .619 | .809 | .693 |
| Variance | .870 | .581 | .486 | .883 | .789 | .723 | .719 | .601 | .543 | .592 | .383 | .654 | .480 |
| Skewness | -.961 | -.744 | -.576 | -1.290 | -.939 | -1.257 | -1.147 | -.635 | -.536 | -1.135 | -.187 | -1.069 | -.429 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | -.109 | .233 | .136 | 1.452 | .419 | 2.006 | .466 | -.045 | .201 | 2.785 | -.523 | 2.102 | .041 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 |
| Range | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 2 | 4 | 3 |

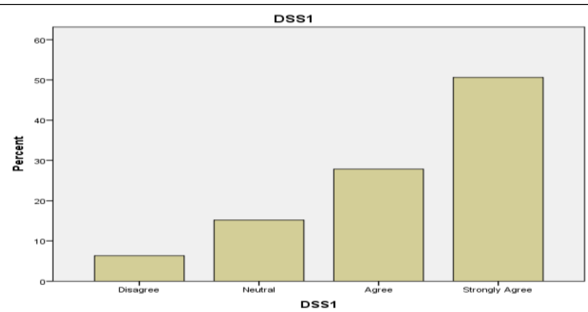



Figure (A7.62) Distribution of understanding the risks associated with innovative idea increases the chance of adopting the idea

**DSS1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 5 | 6.3 | 6.3 | 6.3 |
| | Neutral | 12 | 15.2 | 15.2 | 21.5 |
| | Agree | 22 | 27.8 | 27.8 | 49.4 |
| | Strongly Agree | 40 | 50.6 | 50.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.62) Distribution of understanding the risks associated with innovative idea increases the chance of adopting the idea

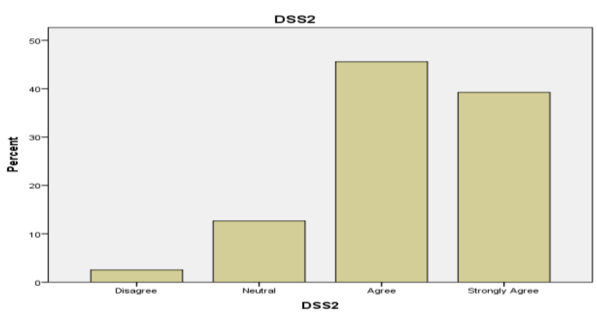



Figure (A7.63) Distribution of smart and diligent individuals spend more time on the evaluation of potential innovation

**DSS2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 10 | 12.7 | 12.7 | 15.2 |
| | Agree | 36 | 45.6 | 45.6 | 60.8 |
| | Strongly Agree | 31 | 39.2 | 39.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.63) Distribution of smart and diligent individuals spend more time on the evaluation of potential innovation

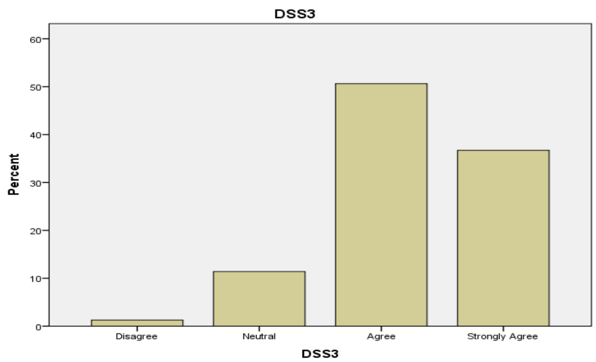



Figure (A7.64) Distribution of being proactive in the innovation idea catalyzes the decision-making process

**DSS3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 9 | 11.4 | 11.4 | 12.7 |
| | Agree | 40 | 50.6 | 50.6 | 63.3 |
| | Strongly Agree | 29 | 36.7 | 36.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.64) Distribution of being proactive in the innovation idea catalyzes the decision-making process

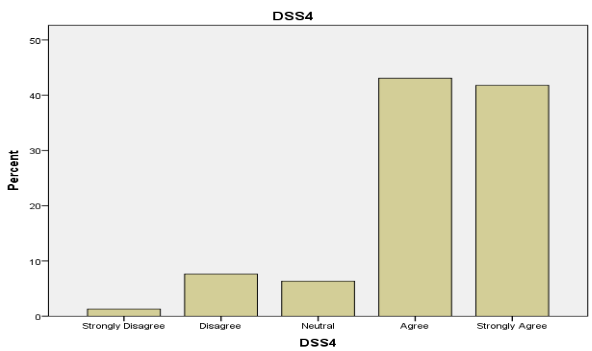



Figure (A7.65) Distribution of teamwork enriches the decision process

**DSS4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 6 | 7.6 | 7.6 | 8.9 |
| | Neutral | 5 | 6.3 | 6.3 | 15.2 |
| | Agree | 34 | 43.0 | 43.0 | 58.2 |
| | Strongly Agree | 33 | 41.8 | 41.8 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.65) Distribution of teamwork enriches the decision process

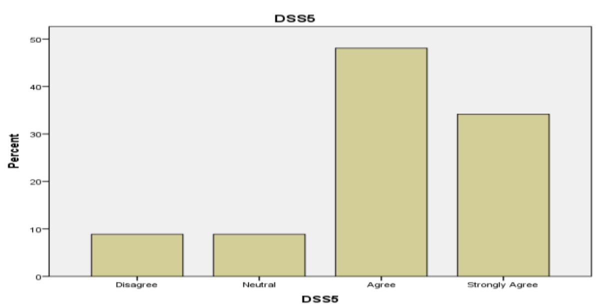



Figure (A7.66) Distribution of problem solving skills catalyze the decision process

**DSS5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 7 | 8.9 | 8.9 | 8.9 |
| | Neutral | 7 | 8.9 | 8.9 | 17.7 |
| | Agree | 38 | 48.1 | 48.1 | 65.8 |
| | Strongly Agree | 27 | 34.2 | 34.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.66) Distribution of problem solving skills catalyze the decision process

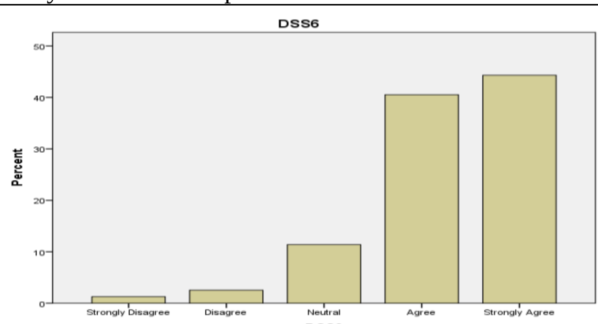



Figure (A7.67) Distribution of communication of risk enrich the decision on adopting new ideas

**DSS6**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 2 | 2.5 | 2.5 | 3.8 |
| | Neutral | 9 | 11.4 | 11.4 | 15.2 |
| | Agree | 32 | 40.5 | 40.5 | 55.7 |
| | Strongly Agree | 35 | 44.3 | 44.3 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.67) Distribution of communication of risk enrich the decision on adopting new ideas

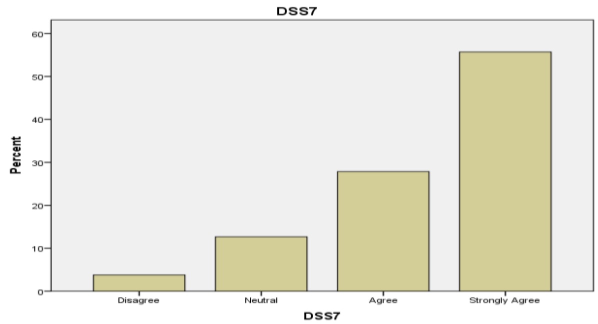



Figure (A7.68) Distribution of decision-making power facilitates adoption of new ideas

**DSS7**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Neutral | 10 | 12.7 | 12.7 | 16.5 |
| | Agree | 22 | 27.8 | 27.8 | 44.3 |
| | Strongly Agree | 44 | 55.7 | 55.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.68) Distribution of decision-making power facilitates adoption of new ideas

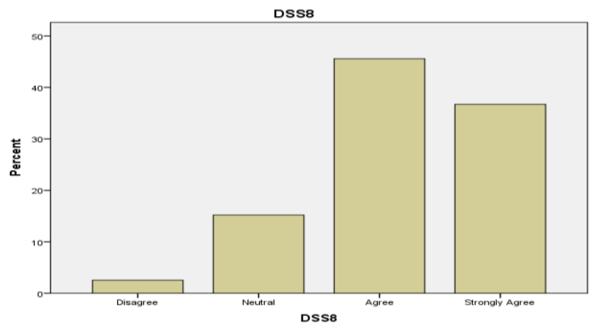



Figure (A7.69) Distribution of unbiased thinking leads to the selection of the most realistic choice

**DSS8**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 12 | 15.2 | 15.2 | 17.7 |
| | Agree | 36 | 45.6 | 45.6 | 63.3 |
| | Strongly Agree | 29 | 36.7 | 36.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.69) Distribution of unbiased thinking leads to the selection of the most realistic choice

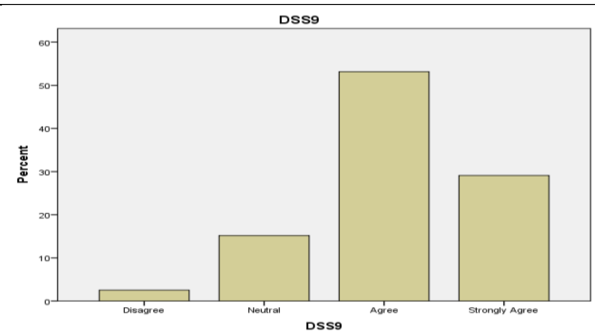



Figure (A7.70) Distribution of incubation techniques influence the degree to which the innovation meets the expected outcomes

**DSS9**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 12 | 15.2 | 15.2 | 17.7 |
| | Agree | 42 | 53.2 | 53.2 | 70.9 |
| | Strongly Agree | 23 | 29.1 | 29.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.70) Distribution of incubation techniques influence the degree to which the innovation meets the expected outcomes

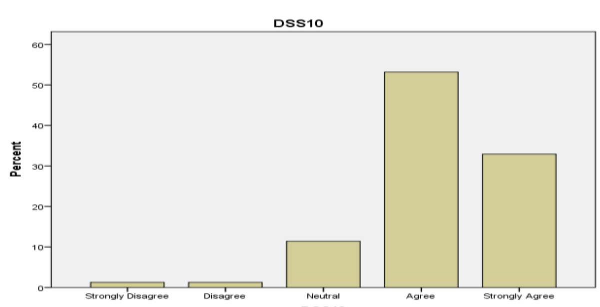



Figure (A7.71) Distribution of modeling concepts provide adequate simulation to make informed decisions

**DSS10**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 1 | 1.3 | 1.3 | 2.5 |
| | Neutral | 9 | 11.4 | 11.4 | 13.9 |
| | Agree | 42 | 53.2 | 53.2 | 67.1 |
| | Strongly Agree | 26 | 32.9 | 32.9 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.71) Distribution of modeling concepts provide adequate simulation to make informed decisions

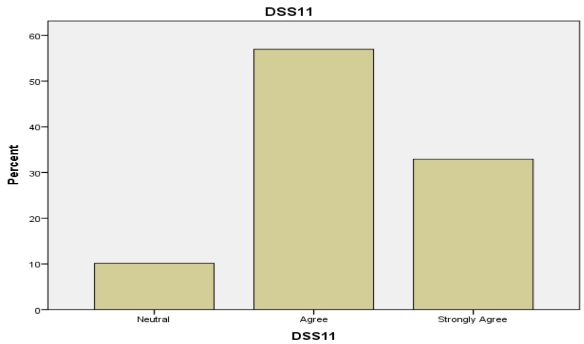



Figure (A7.72) Distribution of prototyping efficiently exposes the real world efficacy of the decision by testing it accordingly

**DSS11**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Neutral | 8 | 10.1 | 10.1 | 10.1 |
| | Agree | 45 | 57.0 | 57.0 | 67.1 |
| | Strongly Agree | 26 | 32.9 | 32.9 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.72) Distribution of prototyping efficiently exposes the real world efficacy of the decision by testing it accordingly

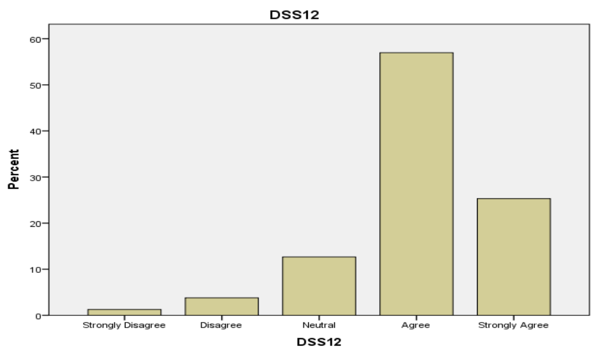



Figure (A7.73) Distribution of understanding and manipulating information sets facilitates more accurate forecasting for the performance of the innovation

**DSS12**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 3 | 3.8 | 3.8 | 5.1 |
| | Neutral | 10 | 12.7 | 12.7 | 17.7 |
| | Agree | 45 | 57.0 | 57.0 | 74.7 |
| | Strongly Agree | 20 | 25.3 | 25.3 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.73) Distribution of understanding and manipulating information sets facilitates more accurate forecasting for the performance of the innovation

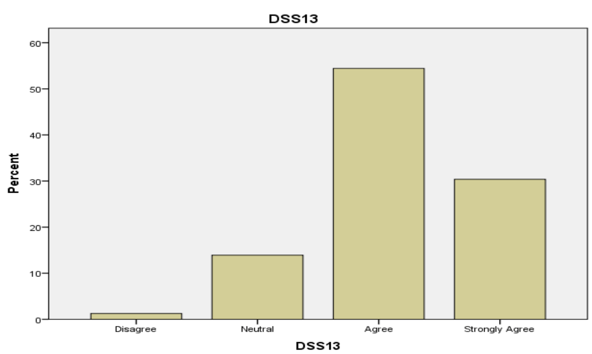



Figure (A7.74) Distribution of the presentation of the argument for and against the decision, facilitates informed buy-in or resistance

**DSS13**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 11 | 13.9 | 13.9 | 15.2 |
| | Agree | 43 | 54.4 | 54.4 | 69.6 |
| | Strongly Agree | 24 | 30.4 | 30.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.74) Distribution of the presentation of the argument for and against the decision, facilitates informed buy-in or resistance

### 7.4.9. Implementation Stage Skills (ISS)

Table (7.4.9) provides descriptive statistics of the implementation stage skills plotted according to the number of respondents. This category of innovation skills factor comprises fifteen variables which are: ISS1, ISS2, ISS3, ISS4, ISS5, ISS6, ISS7, ISS8, ISS9, ISS10, ISS11, ISS12, ISS13, ISS14, and ISS15. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for all variables are above the value of (4) except for ISS5 and ISS14 valued at (3.90) and (3.85) respectively, for the other variables the mean range between (4.06) to (4.46) above the central point value of (3). While the standard deviation of those variables range between (.611) to (1.001). This indicates that respondents have a strong agreement on the statements related to the innovation skills at implantation stage and majority of them have a view towards "agree" and "strongly agree" option, as the median for almost all variable scored at (4) except ISS1 scored (5) and the mode scored at (4) for most of the variables except for ISS1, ISS8, and ISS9 which scored at (5).

As shown in table (7.5.9), the skewness values for all variables are negatively scored and they range between (-.224) and (-1.119) resulting in skewness shape often peaked towards the "agree" and "strongly agree" which indicates an agreement among the majority of respondents' views with almost all variables in the group.

The distribution of all variables are shown in the figure (A7.75) to (A7.89) and table (A7.75) to (A7.89).

Table 7.4.9: Descriptive Statistics of Implementation Stage Skills

**Statistics**

| | ISS1 | ISS2 | ISS3 | ISS4 | ISS5 | ISS6 | ISS7 | ISS8 | ISS9 | ISS10 | ISS11 | ISS12 | ISS13 | ISS14 | ISS15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 4.46 | 4.06 | 4.33 | 4.18 | 3.90 | 4.18 | 4.27 | 4.42 | 4.33 | 4.28 | 4.32 | 4.14 | 4.03 | 3.85 | 4.11 |
| Median | 5.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | .656 | .938 | .693 | .813 | .969 | .797 | .614 | .612 | .746 | .678 | .611 | .780 | .987 | 1.001 | .832 |
| Skewness | -1.089 | -.797 | -.782 | -.780 | -.748 | -.800 | -.224 | -.538 | -.814 | -.408 | -.296 | -.749 | -1.119 | -.866 | -.767 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | 1.314 | -.190 | .413 | .143 | .098 | .330 | -.556 | -.586 | -.053 | -.788 | -.609 | .414 | 1.087 | .423 | .180 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 |
| Range | 3 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 4 | 4 | 3 |

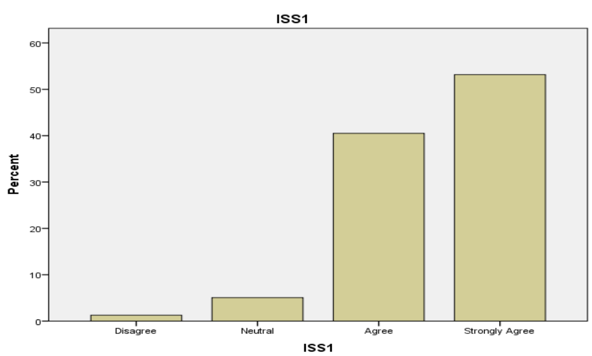



Figure (A7.75) Distribution of implementation skill helps adapt the right tools and technologies to complete a task, project, or assignment

**ISS1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 4 | 5.1 | 5.1 | 6.3 |
| | Agree | 32 | 40.5 | 40.5 | 46.8 |
| | Strongly Agree | 42 | 53.2 | 53.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.75) Distribution of implementation skill helps adapt the right tools and technologies to complete a task, project, or assignment

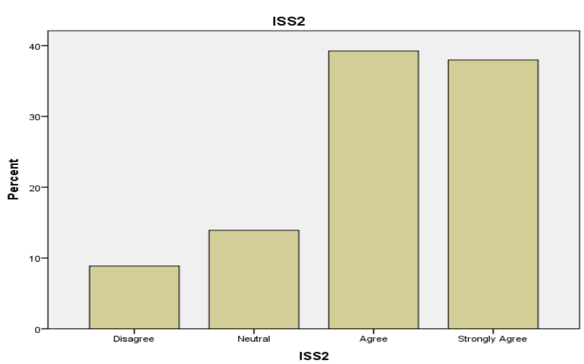



Figure (A7.76) Distribution of employees must be tenacious and persistent to the innovation implemented

**ISS2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 7 | 8.9 | 8.9 | 8.9 |
| | Neutral | 11 | 13.9 | 13.9 | 22.8 |
| | Agree | 31 | 39.2 | 39.2 | 62.0 |
| | Strongly Agree | 30 | 38.0 | 38.0 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.76) Distribution of employees must be tenacious and persistent to the innovation implemented

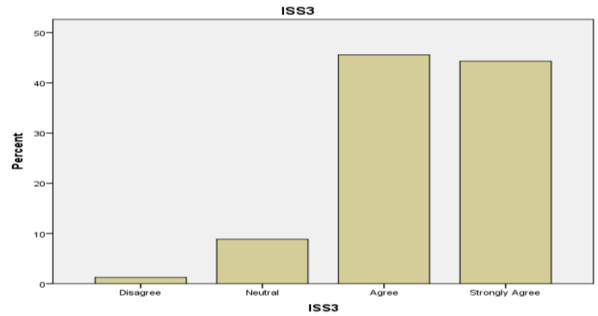



Figure (A7.77) Distribution of relationship-building skill encourages knowledge-sharing during implementation of the innovative idea

**ISS3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 7 | 8.9 | 8.9 | 10.1 |
| | Agree | 36 | 45.6 | 45.6 | 55.7 |
| | Strongly Agree | 35 | 44.3 | 44.3 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.77) Distribution of relationship-building skill encourages knowledge-sharing during implementation of the innovative idea

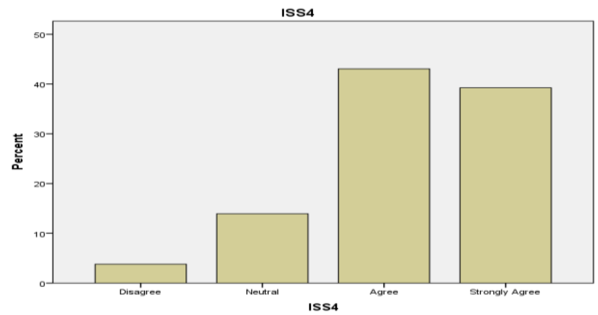



Figure (A7.78) Distribution of accountability fosters stakeholder adoption of innovation

**ISS4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Neutral | 11 | 13.9 | 13.9 | 17.7 |
| | Agree | 34 | 43.0 | 43.0 | 60.8 |
| | Strongly Agree | 31 | 39.2 | 39.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.78) Distribution of accountability fosters stakeholder adoption of innovation

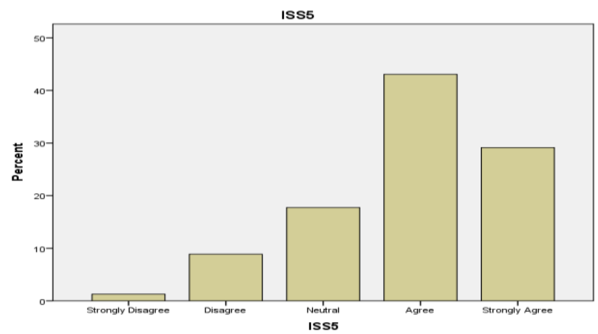



Figure (A7.79) Distribution of performance measurement encourages the adoption of innovation

**ISS5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 7 | 8.9 | 8.9 | 10.1 |
| | Neutral | 14 | 17.7 | 17.7 | 27.8 |
| | Agree | 34 | 43.0 | 43.0 | 70.9 |
| | Strongly Agree | 23 | 29.1 | 29.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.79) Distribution of performance measurement encourages the adoption of innovation

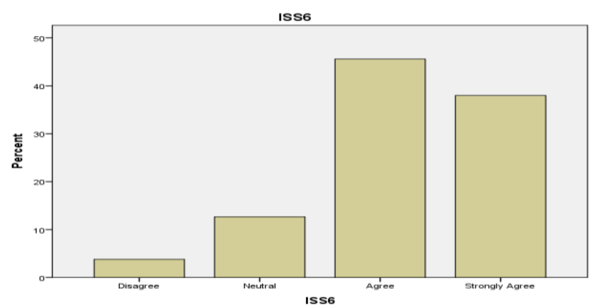



Figure (A7.80) Distribution of planning effectively shows the level of fit between the innovation and its usability

**ISS6**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Neutral | 10 | 12.7 | 12.7 | 16.5 |
| | Agree | 36 | 45.6 | 45.6 | 62.0 |
| | Strongly Agree | 30 | 38.0 | 38.0 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.80) Distribution of planning effectively shows the level of fit between the innovation and its usability

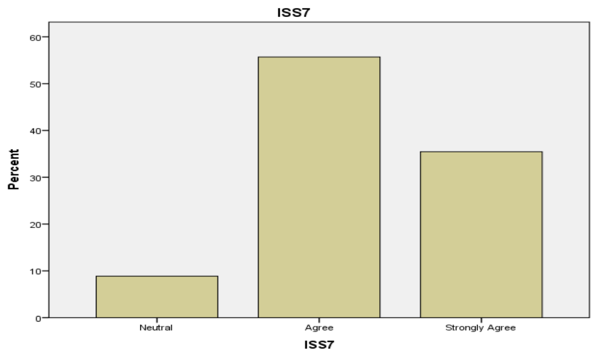



Figure (A7.81) Distribution of coordination streamlines implementation processes to improve value chain efficiency

**ISS7**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Neutral | 7 | 8.9 | 8.9 | 8.9 |
| | Agree | 44 | 55.7 | 55.7 | 64.6 |
| | Strongly Agree | 28 | 35.4 | 35.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.81) Distribution of coordination streamlines implementation processes to improve value chain efficiency

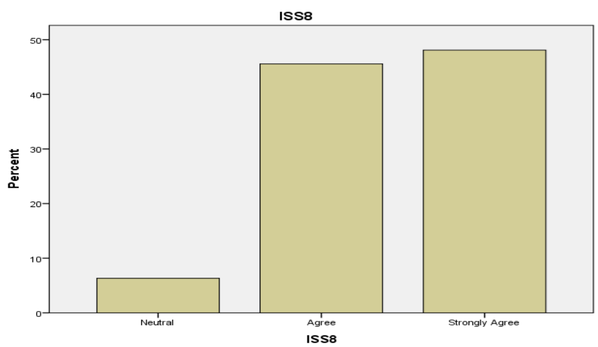



Figure (A7.82) Distribution of teamwork provides the opportunity to successful implementation of new ideas

**ISS8**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Neutral | 5 | 6.3 | 6.3 | 6.3 |
| | Agree | 36 | 45.6 | 45.6 | 51.9 |
| | Strongly Agree | 38 | 48.1 | 48.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.82) Distribution of teamwork provides the opportunity to successful implementation of new ideas

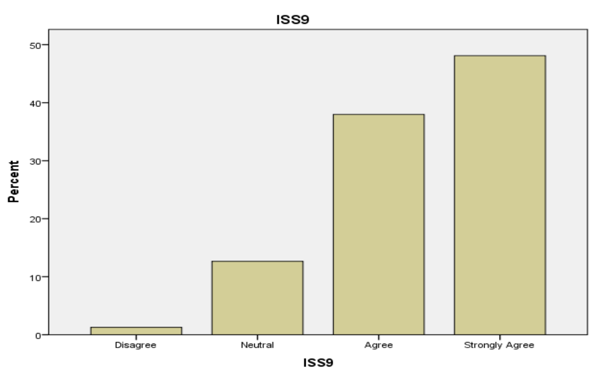
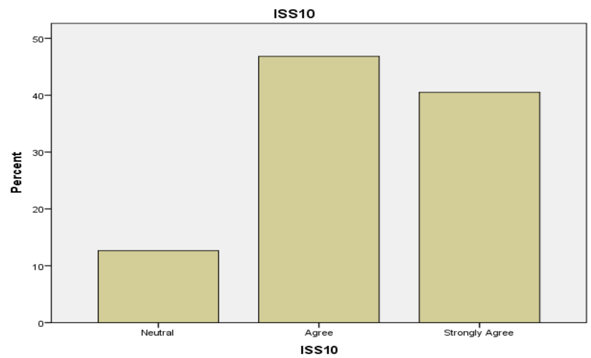
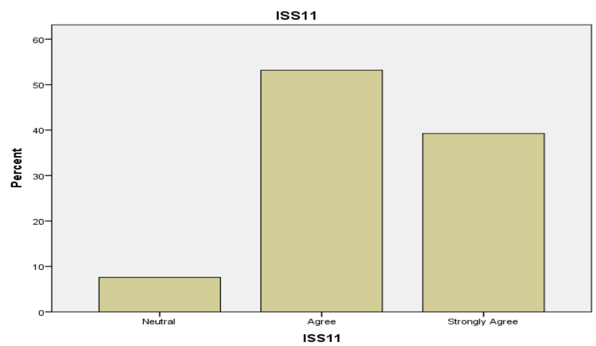
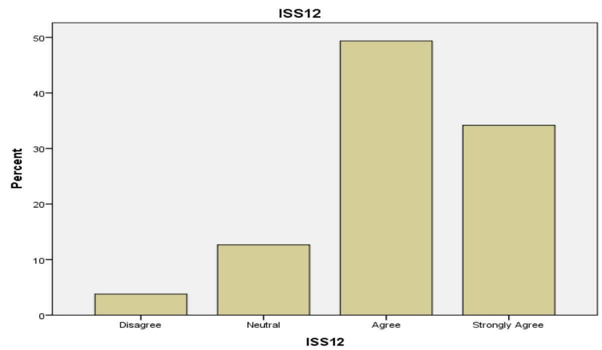


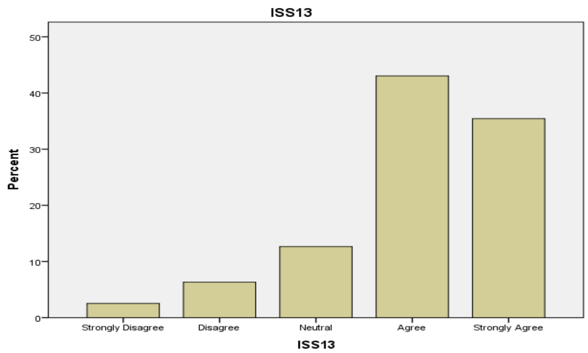

Figure (A7.83) Distribution of problem solving skills assist in eliminating obstacles for innovation implementation

**ISS9**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 10 | 12.7 | 12.7 | 13.9 |
| | Agree | 30 | 38.0 | 38.0 | 51.9 |
| | Strongly Agree | 38 | 48.1 | 48.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.83) Distribution of problem solving skills assist in eliminating obstacles for innovation implementation

| | |
|---|---|
|  | **ISS10**<br><table><tr><th></th><th></th><th>Frequency</th><th>Percent</th><th>Valid Percent</th><th>Cumulative Percent</th></tr><tr><td>Valid</td><td>Neutral</td><td>10</td><td>12.7</td><td>12.7</td><td>12.7</td></tr><tr><td></td><td>Agree</td><td>37</td><td>46.8</td><td>46.8</td><td>59.5</td></tr><tr><td></td><td>Strongly Agree</td><td>32</td><td>40.5</td><td>40.5</td><td>100.0</td></tr><tr><td></td><td>Total</td><td>79</td><td>100.0</td><td>100.0</td><td></td></tr></table> |
| Figure (A7.84) Distribution of ability to communicate issues generates opportunities in the implementation from multiple perspectives | Table (A7.84) Distribution of ability to communicate issues generates opportunities in the implementation from multiple perspectives |
|  | **ISS11**<br><table><tr><th></th><th></th><th>Frequency</th><th>Percent</th><th>Valid Percent</th><th>Cumulative Percent</th></tr><tr><td>Valid</td><td>Neutral</td><td>6</td><td>7.6</td><td>7.6</td><td>7.6</td></tr><tr><td></td><td>Agree</td><td>42</td><td>53.2</td><td>53.2</td><td>60.8</td></tr><tr><td></td><td>Strongly Agree</td><td>31</td><td>39.2</td><td>39.2</td><td>100.0</td></tr><tr><td></td><td>Total</td><td>79</td><td>100.0</td><td>100.0</td><td></td></tr></table> |
| Figure (A7.85) Distribution of creative abilities have positive impact on innovation quality | Table (A7.85) Distribution of creative abilities have positive impact on innovation quality |
|  | **ISS12**<br><table><tr><th></th><th></th><th>Frequency</th><th>Percent</th><th>Valid Percent</th><th>Cumulative Percent</th></tr><tr><td>Valid</td><td>Disagree</td><td>3</td><td>3.8</td><td>3.8</td><td>3.8</td></tr><tr><td></td><td>Neutral</td><td>10</td><td>12.7</td><td>12.7</td><td>16.5</td></tr><tr><td></td><td>Agree</td><td>39</td><td>49.4</td><td>49.4</td><td>65.8</td></tr><tr><td></td><td>Strongly Agree</td><td>27</td><td>34.2</td><td>34.2</td><td>100.0</td></tr><tr><td></td><td>Total</td><td>79</td><td>100.0</td><td>100.0</td><td></td></tr></table> |
| Figure (A7.86) Distribution of risk-taking skills enables the implementers to continue with the process and therefore transcend challenges | Table (A7.86) Distribution of risk-taking skills enables the implementers to continue with the process and therefore transcend challenges |

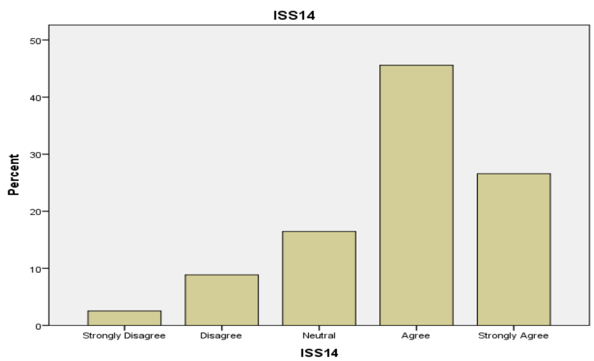



**ISS13**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Disagree | 5 | 6.3 | 6.3 | 8.9 |
| | Neutral | 10 | 12.7 | 12.7 | 21.5 |
| | Agree | 34 | 43.0 | 43.0 | 64.6 |
| | Strongly Agree | 28 | 35.4 | 35.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.87) Distribution of managerial skills influence the rates of accountability and delegation

Table (A7.87) Distribution of managerial skills influence the rates of accountability and delegation

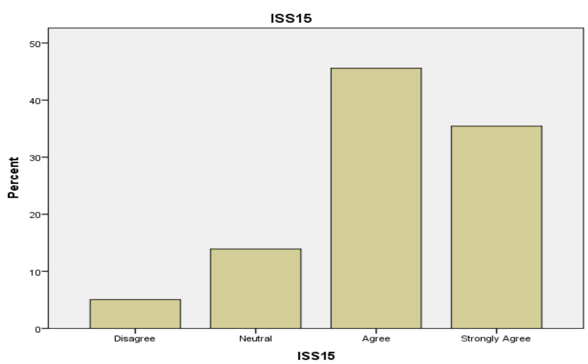



**ISS14**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Disagree | 7 | 8.9 | 8.9 | 11.4 |
| | Neutral | 13 | 16.5 | 16.5 | 27.8 |
| | Agree | 36 | 45.6 | 45.6 | 73.4 |
| | Strongly Agree | 21 | 26.6 | 26.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.88) Distribution of managerial skills determine the efficacy of team work in innovation implementation

Table (A7.88) Distribution of managerial skills determine the efficacy of team work in innovation implementation




**ISS15**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Neutral | 11 | 13.9 | 13.9 | 19.0 |
| | Agree | 36 | 45.6 | 45.6 | 64.6 |
| | Strongly Agree | 28 | 35.4 | 35.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.89) Distribution of the level of cohesion between the team determines the success of implementation

Table (A7.89) Distribution of the level of cohesion between the team determines the success of implementation

### 7.4.10. Scaling-up Stage Skills (SSS)

Table (7.4.10) provides descriptive statistics of the scaling-up stage skills plotted according to the number of respondents. This category of innovation skills factor comprises fifteen variables which are: SSS1, SSS2, SSS3, SSS4, SSS5, SSS6, SSS7, SSS8, SSS9, SSS10, SSS11, SSS12, SSS13, SSS14, and SSS15. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for all variables are above the value of (4) except for SSS1, SSS2 and ISS14 valued at (3.95), (3.92), and (3.77) respectively, for the other variables the mean range between (4.01) to (4.33) above the central point value of (3). While the standard deviation of those variables range between (.659) to (0.876). This indicates that respondents have a good agreement on the statements related to the innovation skills at scaling-up stage and majority of them have a view towards “agree” and “strongly agree” option, as the median and the mode for all variable scored at (4).

As shown in table (7.5.10), the skewness values for all variables are negatively scored and they range between (-.471) and (-1.191) resulting in skewness shape often peaked towards the “agree” and “strongly agree” which indicates an agreement among the majority of respondents’ views with almost all variables in the group.

The distribution of all variables are shown in the figure (A7.90) to (A7.104) and table (A7.90) to (A7.104).

Table 7.4.10: Descriptive Statistics of Scaling-up Stage Skills

**Statistics**

| | SSS1 | SSS2 | SSS3 | SSS4 | SSS5 | SSS6 | SSS7 | SSS8 | SSS9 | SSS10 | SSS11 | SSS12 | SSS13 | SSS14 | SSS15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 3.95 | 3.92 | 4.01 | 3.77 | 4.01 | 4.13 | 4.23 | 4.09 | 4.04 | 4.10 | 4.16 | 4.16 | 4.15 | 4.14 | 4.33 |
| Median | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Std. Deviation | .799 | .764 | .742 | .876 | .776 | .723 | .659 | .865 | .823 | .778 | .687 | .758 | .786 | .828 | .693 |
| Skewness | -.836 | -1.108 | -.406 | -.471 | -.528 | -.614 | -.556 | -.784 | -1.061 | -.515 | -.468 | -1.191 | -.765 | -.824 | -.782 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | 1.592 | 2.607 | -.037 | -.322 | .082 | .485 | .566 | .092 | 1.922 | -.223 | .139 | 3.145 | .381 | .315 | .413 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 |
| Range | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 3 | 3 |

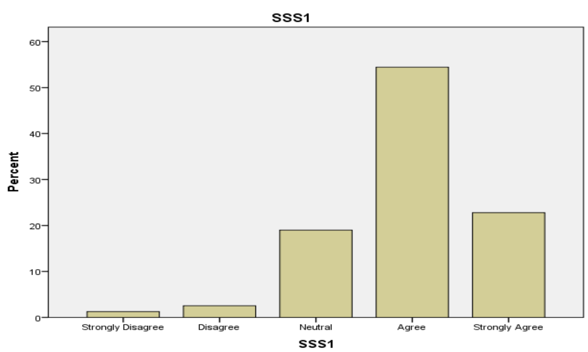



Figure (A7.90) Distribution of the managerial approach determines stakeholder involvement in scaling-up

**SSS1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 2 | 2.5 | 2.5 | 3.8 |
| | Neutral | 15 | 19.0 | 19.0 | 22.8 |
| | Agree | 43 | 54.4 | 54.4 | 77.2 |
| | Strongly Agree | 18 | 22.8 | 22.8 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.90) Distribution of the managerial approach determines stakeholder involvement in scaling-up

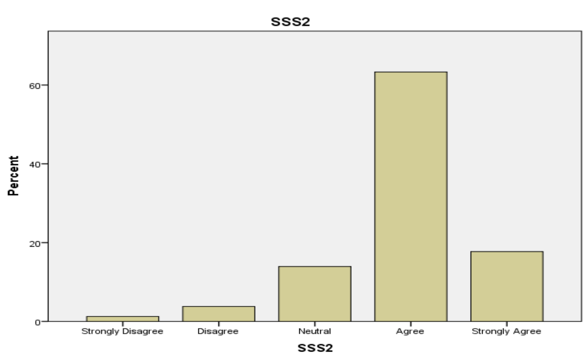



Figure (A7.91) Distribution of the managerial approach has influence on the risk which is acceptable in scaling-up

**SSS2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 3 | 3.8 | 3.8 | 5.1 |
| | Neutral | 11 | 13.9 | 13.9 | 19.0 |
| | Agree | 50 | 63.3 | 63.3 | 82.3 |
| | Strongly Agree | 14 | 17.7 | 17.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.91) Distribution of the managerial approach has influence on the risk which is acceptable in scaling-up

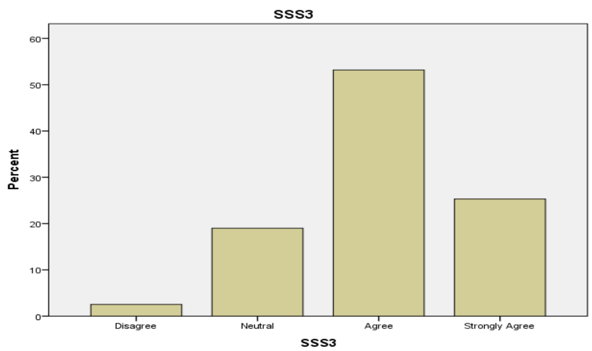



Figure (A7.92) Distribution of team cohesion determines the team's divergence on scaling-up

**SSS3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 15 | 19.0 | 19.0 | 21.5 |
| | Agree | 42 | 53.2 | 53.2 | 74.7 |
| | Strongly Agree | 20 | 25.3 | 25.3 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.92) Distribution of team cohesion determines the team's divergence on scaling-up

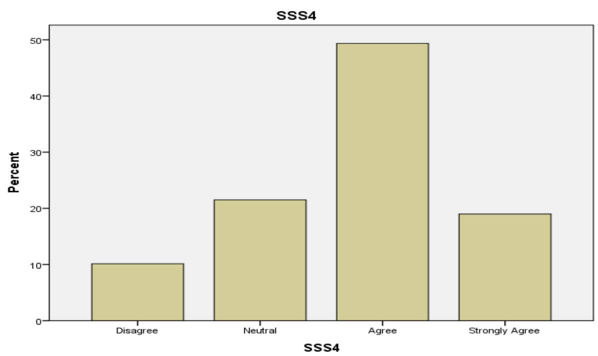



Figure (A7.93) Distribution of emotional intelligence exposes the stakeholders' perception about the scaling-up of the adopted innovation

**SSS4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 8 | 10.1 | 10.1 | 10.1 |
| | Neutral | 17 | 21.5 | 21.5 | 31.6 |
| | Agree | 39 | 49.4 | 49.4 | 81.0 |
| | Strongly Agree | 15 | 19.0 | 19.0 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.93) Distribution of emotional intelligence exposes the stakeholders' perception about the scaling-up of the adopted innovation

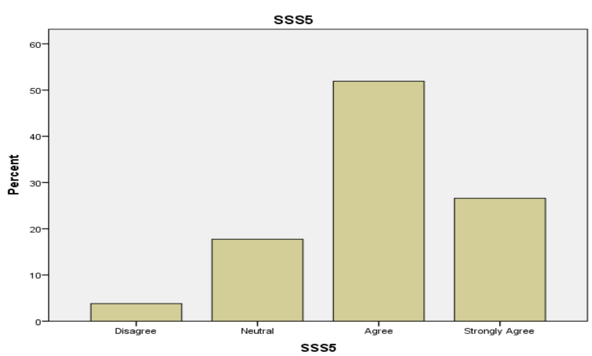



Figure (A7.94) Distribution of endurance to obstacles provides a foundation on which the implementers can scale-up the adoption of innovation

**SSS5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Neutral | 14 | 17.7 | 17.7 | 21.5 |
| | Agree | 41 | 51.9 | 51.9 | 73.4 |
| | Strongly Agree | 21 | 26.6 | 26.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.94) Distribution of endurance to obstacles provides a foundation on which the implementers can scale-up the adoption of innovation

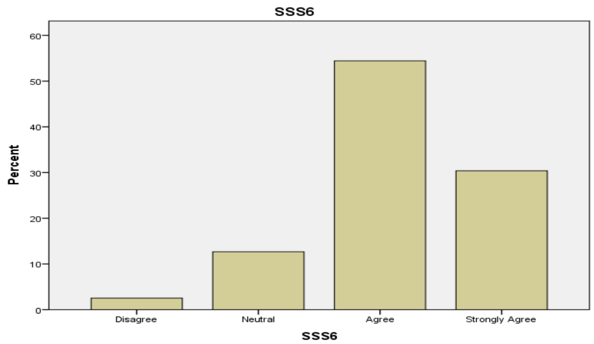



Figure (A7.95) Distribution of openness on new ideas and continuous improvement assist in the scaling-up process

**SSS6**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 10 | 12.7 | 12.7 | 15.2 |
| | Agree | 43 | 54.4 | 54.4 | 69.6 |
| | Strongly Agree | 24 | 30.4 | 30.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.95) Distribution of openness on new ideas and continuous improvement assist in the scaling-up process

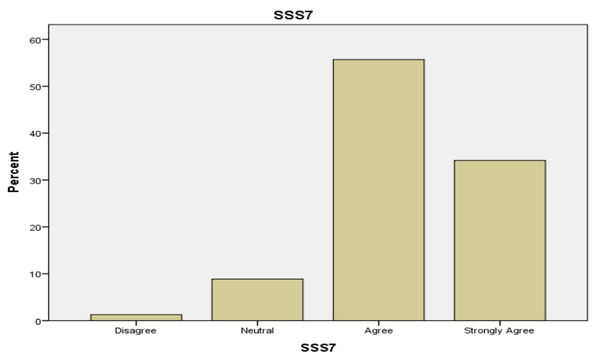



Figure (A7.96) Distribution of sharing information and expertise inside the organization helps in the scaling-up process

**SSS7**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 7 | 8.9 | 8.9 | 10.1 |
| | Agree | 44 | 55.7 | 55.7 | 65.8 |
| | Strongly Agree | 27 | 34.2 | 34.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.96) Distribution of sharing information and expertise inside the organization helps in the scaling-up process

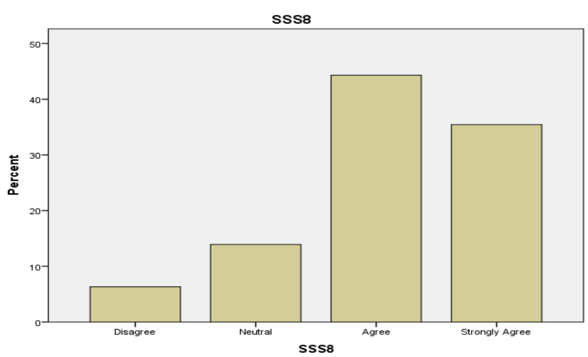



Figure (A7.97) Distribution of negotiation skill overcomes barriers among people that may hinder the scaling-up of the innovation

**SSS8**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 5 | 6.3 | 6.3 | 6.3 |
| | Neutral | 11 | 13.9 | 13.9 | 20.3 |
| | Agree | 35 | 44.3 | 44.3 | 64.6 |
| | Strongly Agree | 28 | 35.4 | 35.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.97) Distribution of negotiation skill overcomes barriers among people that may hinder the scaling-up of the innovation

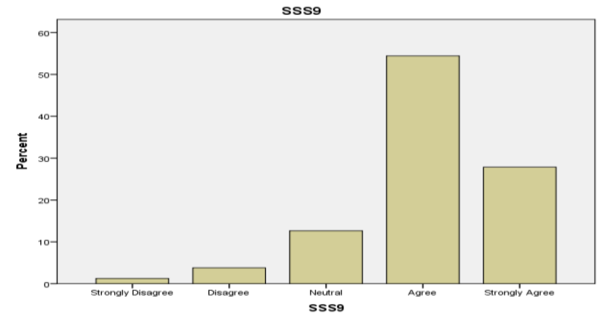



Figure (A7.98) Distribution of individuals with negotiation skill provide sources for assisting the scale-up process

**SSS9**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 3 | 3.8 | 3.8 | 5.1 |
| | Neutral | 10 | 12.7 | 12.7 | 17.7 |
| | Agree | 43 | 54.4 | 54.4 | 72.2 |
| | Strongly Agree | 22 | 27.8 | 27.8 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.98) Distribution of individuals with negotiation skill provide sources for assisting the scale-up process

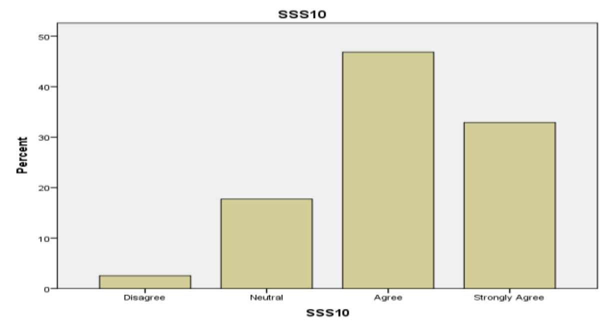



Figure (A7.99) Distribution of delegating responsibility and providing support improve the chance of the scaling-up success

**SSS10**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 14 | 17.7 | 17.7 | 20.3 |
| | Agree | 37 | 46.8 | 46.8 | 67.1 |
| | Strongly Agree | 26 | 32.9 | 32.9 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.99) Distribution of delegating responsibility and providing support improve the chance of the scaling-up success

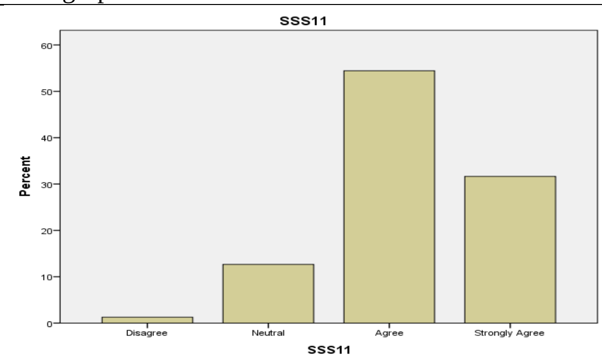



Figure (A7.100) Distribution of collaboration makes it easy for the scaling-up process

**SSS11**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 10 | 12.7 | 12.7 | 13.9 |
| | Agree | 43 | 54.4 | 54.4 | 68.4 |
| | Strongly Agree | 25 | 31.6 | 31.6 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.100) Distribution of collaboration makes it easy for the scaling-up process

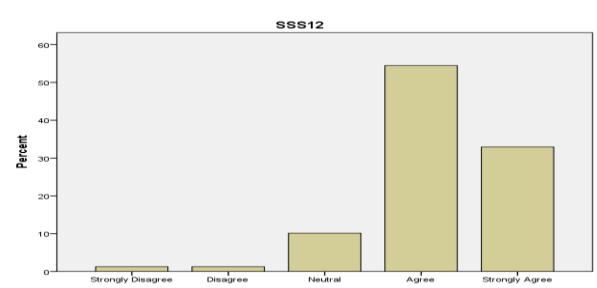



Figure (A7.101) Distribution of collaborative efforts facilitate allocation of resources for networking and sharing ideas, knowledge, and skills to improve the scaling process

**SSS12**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Disagree | 1 | 1.3 | 1.3 | 2.5 |
| | Neutral | 8 | 10.1 | 10.1 | 12.7 |
| | Agree | 43 | 54.4 | 54.4 | 67.1 |
| | Strongly Agree | 26 | 32.9 | 32.9 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.101) Distribution of collaborative efforts facilitate allocation of resources for networking and sharing ideas, knowledge, and skills to improve the scaling process

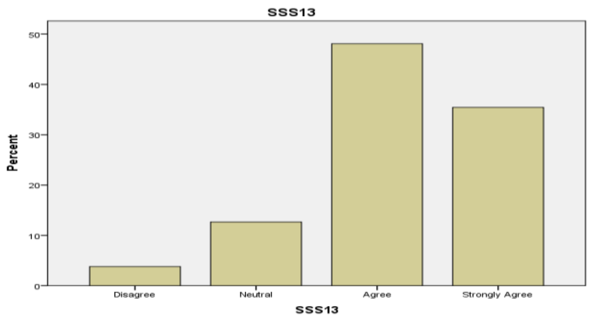



Figure (A7.102) Distribution of recognizing opportunities for change and improvement facilitates the scaling process

**SSS13**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Neutral | 10 | 12.7 | 12.7 | 16.5 |
| | Agree | 38 | 48.1 | 48.1 | 64.6 |
| | Strongly Agree | 28 | 35.4 | 35.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.102) Distribution of recognizing opportunities for change and improvement facilitates the scaling process

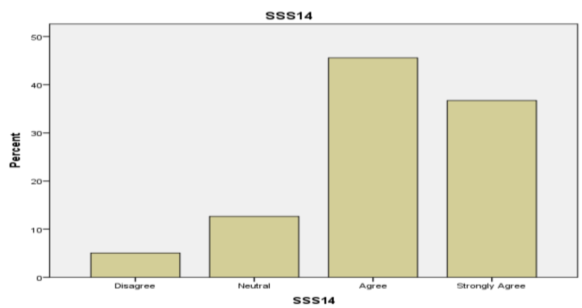



Figure (A7.103) Distribution of the existence of the continuous improvement ethos facilitates the scaling process

**SSS14**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Neutral | 10 | 12.7 | 12.7 | 17.7 |
| | Agree | 36 | 45.6 | 45.6 | 63.3 |
| | Strongly Agree | 29 | 36.7 | 36.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.103) Distribution of the existence of the continuous improvement ethos facilitates the scaling process

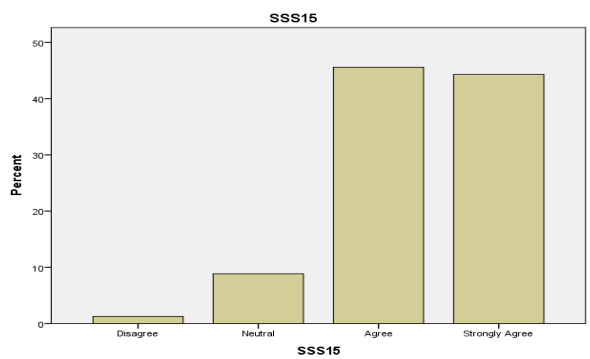



Figure (A7.104) Distribution of accepting feedback and learning from experience and mistakes leads to scaling-up innovative ideas successfully

**SSS15**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 7 | 8.9 | 8.9 | 10.1 |
| | Agree | 36 | 45.6 | 45.6 | 55.7 |
| | Strongly Agree | 35 | 44.3 | 44.3 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.104) Distribution of accepting feedback and learning from experience and mistakes leads to scaling-up innovative ideas successfully

### 7.4.11. Innovation Outcomes (IO)

Table (7.4.11) provides descriptive statistics of the innovation outcomes plotted according to the number of respondents. This category of innovation skills factor comprises fifteen variables which are: IO1, IO2, IO3, IO4, IO5, IO6, IO7, IO8, IO9, IO10, IO11, and IO12. The table presents that all variables values of standard deviation fall within the range of ±1 away from the mean, as well as the value of skewness and kurtosis fall within the range of ±1.96, which clearly indicates normality of the data distribution.

The mean for all variables are above the value of (4) and they range between (4.16) to (4.48) above the central point value of (3). While the standard deviation of those variables range between (.694) to (0.856). This indicates that respondents have a very strong agreement on the statements related to the innovation outcomes and majority of them have a view towards "agree" and "strongly agree" option, as the median and the mode for all variable scored at (4).

As shown in table (7.5.11), the skewness values for all variables are negatively scored and they range between (-.723) and (-1.559) resulting in skewness shape peaked towards the "strongly agree" which indicates an excellent agreement among the majority of respondents' views with all the variables in the group.

The distribution of all variables are shown in the figure (A7.105) to (A7.116) and table (A7.105) to (A7.116).

Table 7.4.11: Descriptive Statistics of Innovation Outcomes

**Statistics**

| | SO1 | SO2 | SO3 | SO4 | SO5 | EO6 | EO7 | EO8 | EO9 | PSO10 | PSO11 | PSO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 4.48 | 4.42 | 4.47 | 4.37 | 4.32 | 4.42 | 4.16 | 4.46 | 4.41 | 4.48 | 4.46 | 4.42 |
| Median | 5.00 | 5.00 | 5.00 | 5.00 | 4.00 | 5.00 | 4.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Mode | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Std. Deviation | .766 | .826 | .713 | .803 | .809 | .778 | .839 | .694 | .855 | .714 | .712 | .856 |
| Skewness | -1.429 | -1.481 | -1.192 | -1.074 | -1.241 | -1.394 | -.723 | -1.135 | -1.400 | -1.452 | -1.368 | -1.559 |
| Std. Error of Skewness | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 | .271 |
| Kurtosis | 1.480 | 1.727 | .871 | .371 | 1.361 | 1.740 | -.170 | .956 | 1.220 | 2.210 | 2.029 | 1.850 |
| Std. Error of Kurtosis | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 | .535 |
| Range | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

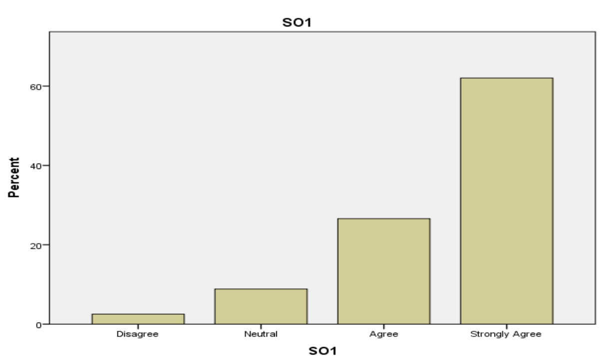



Figure (A7.105) Distribution of happiness is an important societal quality, as it fosters nation's welfare, wealth accumulation and invention

**SO1**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 7 | 8.9 | 8.9 | 11.4 |
| | Agree | 21 | 26.6 | 26.6 | 38.0 |
| | Strongly Agree | 49 | 62.0 | 62.0 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.105) Distribution of happiness is an important societal quality, as it fosters nation's welfare, wealth accumulation and invention

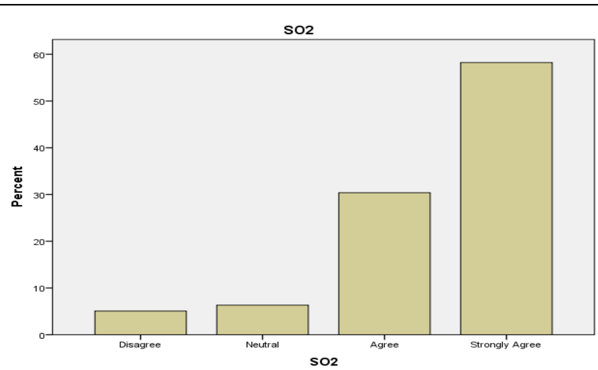



Figure (A7.106) Distribution of happy people are more optimistic, confident, and are willing to navigate

**SO2**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Neutral | 5 | 6.3 | 6.3 | 11.4 |
| | Agree | 24 | 30.4 | 30.4 | 41.8 |
| | Strongly Agree | 46 | 58.2 | 58.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.106) Distribution of happy people are more optimistic, confident, and are willing to navigate untested environments to achieve goals and build sound institutions

untested environments to achieve goals and build sound institutions

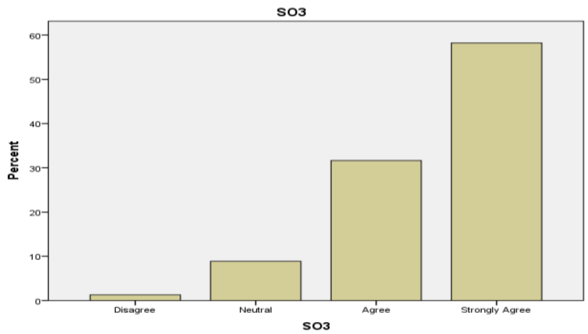



Figure (A7.107) Distribution of innovation is a crucial factor for ensuring economic growth, competitiveness, and the wellbeing of society

**SO3**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 7 | 8.9 | 8.9 | 10.1 |
| | Agree | 25 | 31.6 | 31.6 | 41.8 |
| | Strongly Agree | 46 | 58.2 | 58.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.107) Distribution of innovation is a crucial factor for ensuring economic growth, competitiveness, and the wellbeing of society

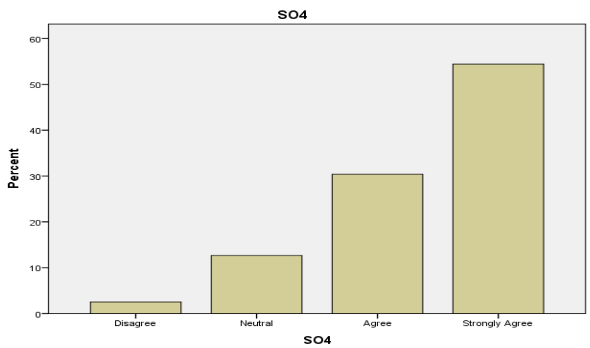



Figure (A7.108) Distribution of innovation creates jobs and gives people opportunities to utilize their potential, while being active economic and social players

**SO4**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 10 | 12.7 | 12.7 | 15.2 |
| | Agree | 24 | 30.4 | 30.4 | 45.6 |
| | Strongly Agree | 43 | 54.4 | 54.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.108) Distribution of innovation creates jobs and gives people opportunities to utilize their potential, while being active economic and social players

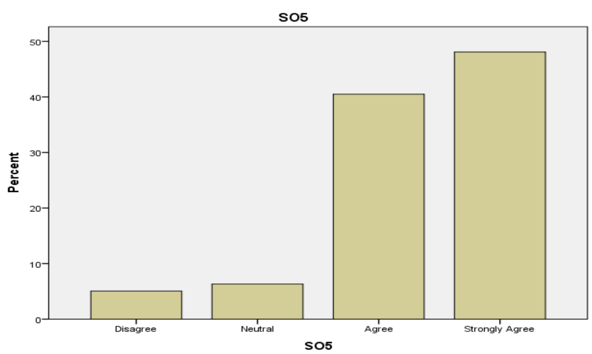



Figure (A7.109) Distribution of innovation leads to the development of talented work force

**SO5**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Neutral | 5 | 6.3 | 6.3 | 11.4 |
| | Agree | 32 | 40.5 | 40.5 | 51.9 |
| | Strongly Agree | 38 | 48.1 | 48.1 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.109) Distribution of innovation leads to the development of talented work force

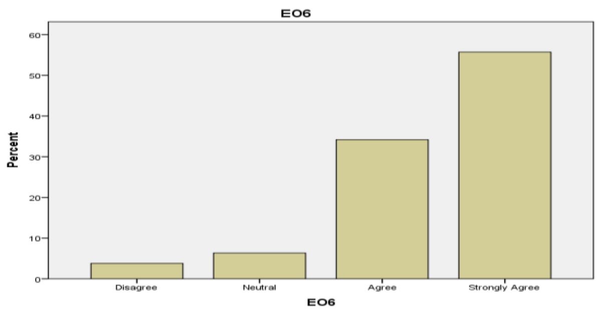



Figure (A7.110) Distribution of innovation leads to the creation of new sources of wealth

**EO6**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Neutral | 5 | 6.3 | 6.3 | 10.1 |
| | Agree | 27 | 34.2 | 34.2 | 44.3 |
| | Strongly Agree | 44 | 55.7 | 55.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.110) Distribution of innovation leads to the creation of new sources of wealth

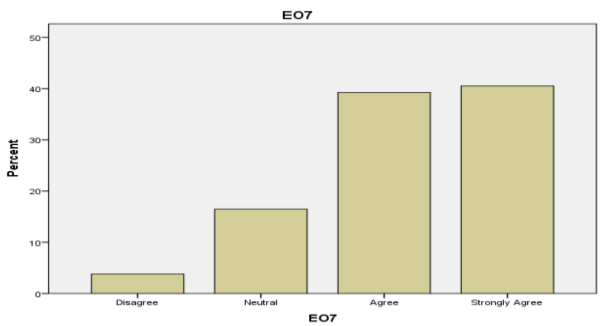



Figure (A7.111) Distribution of innovation leads to financial optimization

**EO7**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 3 | 3.8 | 3.8 | 3.8 |
| | Neutral | 13 | 16.5 | 16.5 | 20.3 |
| | Agree | 31 | 39.2 | 39.2 | 59.5 |
| | Strongly Agree | 32 | 40.5 | 40.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.111) Distribution of innovation leads to financial optimization

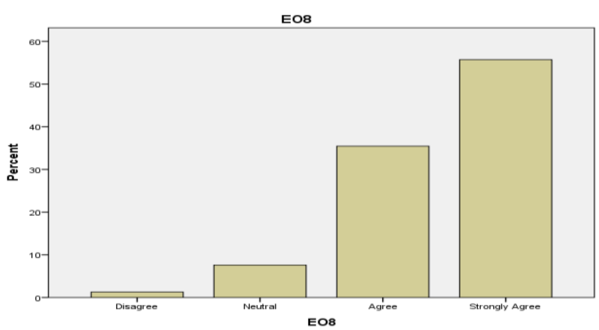



Figure (A7.112) Distribution of innovation leads to service performance improvement

**EO8**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 1 | 1.3 | 1.3 | 1.3 |
| | Neutral | 6 | 7.6 | 7.6 | 8.9 |
| | Agree | 28 | 35.4 | 35.4 | 44.3 |
| | Strongly Agree | 44 | 55.7 | 55.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.112) Distribution of innovation leads to service performance improvement

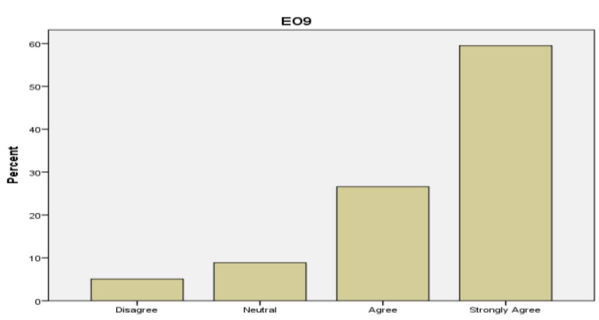
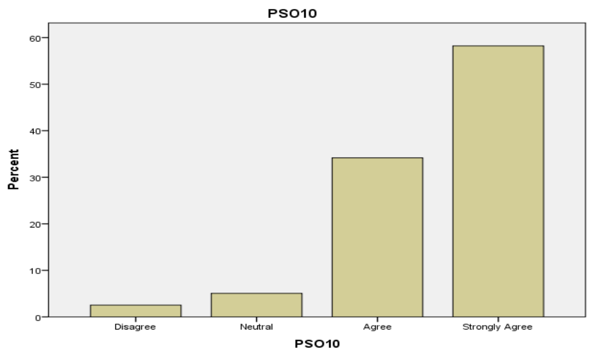



Figure (A7.113) Distribution of innovation leads to the discovery of the unmet needs of current and future generation

**EO9**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 4 | 5.1 | 5.1 | 5.1 |
| | Neutral | 7 | 8.9 | 8.9 | 13.9 |
| | Agree | 21 | 26.6 | 26.6 | 40.5 |
| | Strongly Agree | 47 | 59.5 | 59.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Table (A7.113) Distribution of innovation leads to the discovery of the unmet needs of current and future generation

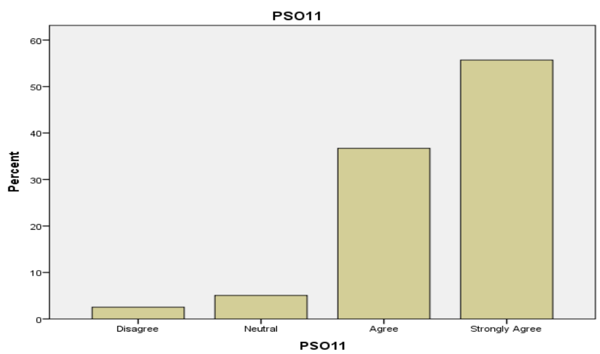



**PSO10**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 4 | 5.1 | 5.1 | 7.6 |
| | Agree | 27 | 34.2 | 34.2 | 41.8 |
| | Strongly Agree | 46 | 58.2 | 58.2 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.114) Distribution of innovation can be instrumental in enhancing products, services and processes in public sector

Table (A7.114) Distribution of innovation can be instrumental in enhancing products, services and processes in public sector

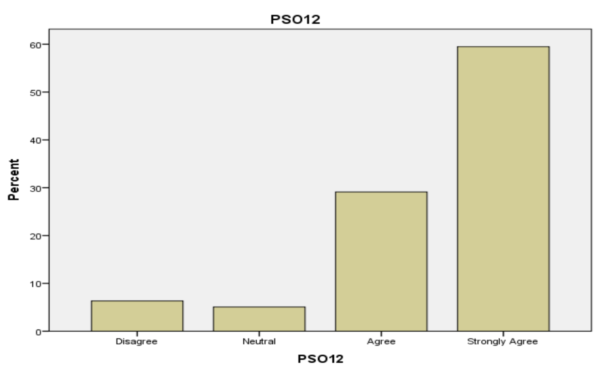



**PSO11**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 2 | 2.5 | 2.5 | 2.5 |
| | Neutral | 4 | 5.1 | 5.1 | 7.6 |
| | Agree | 29 | 36.7 | 36.7 | 44.3 |
| | Strongly Agree | 44 | 55.7 | 55.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.115) Distribution of innovation plays a significant role in encouraging and stimulating service improvement

Table (A7.115) Distribution of innovation plays a significant role in encouraging and stimulating service improvement




**PSO12**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Disagree | 5 | 6.3 | 6.3 | 6.3 |
| | Neutral | 4 | 5.1 | 5.1 | 11.4 |
| | Agree | 23 | 29.1 | 29.1 | 40.5 |
| | Strongly Agree | 47 | 59.5 | 59.5 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Figure (A7.116) Distribution of innovative and talented individuals are attracted to places where their talent is recognized, appreciated, and deployed

Table (A7.116) Distribution of innovative and talented individuals are attracted to places where their talent is recognized, appreciated, and deployed

# Appendix 4 - Detailed Regression Analysis

### 9.7. Modelling the impact of performance level measurements factors on the success of social innovation initiatives

This sections undergo the first cycle of regression analyses focusing on the impact of the performance of each identified level particularly on the success of social innovation initiatives. The analyses of the relationships and the predictions will take into consideration the mediation effect of the skills required at each stage of the innovation process to diffuse innovation strategy in the public sector.

#### 9.7.1. Regression between Project Level Measurements and Social Outcomes, mediated by Innovation Skills:

Table 9.7.1.1 is the model summary that represents the regression between project level measurements and social outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 12 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (16 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 16 variables and ended up with only 5 variables which are: PLM4, SSSN1, PSSN1, PLM5, ISSN1. The selected model for this regression is model number 12; the last generated model due to the application of backward method. The variation in social innovation success can be explained by the model comprised of the two independent and 3 mediator variables. In this case the multiple correlation is (.671) and the R Square value is (.450) and Adjusted R Square value is (.413). This means that there is a high degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over 41% of variance in the success of social outcomes could be explained by the performance of projects taking into account the skills of problem solving, augmentation, and accountability.

Table 9.7.1.1: Model summary for regression between the PLM and the SO, mediating by IS

**Model Summary[m]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .702[a] | .493 | .362 | .489 | .493 | 3.765 | 16 | 62 | .000 |
| 2 | .702[b] | .493 | .372 | .485 | .000 | .016 | 1 | 62 | .900 |
| 3 | .702[c] | .493 | .382 | .481 | .000 | .015 | 1 | 63 | .903 |
| 4 | .701[d] | .492 | .390 | .478 | -.001 | .102 | 1 | 64 | .751 |
| 5 | .700[e] | .490 | .397 | .475 | -.002 | .279 | 1 | 65 | .599 |
| 6 | .698[f] | .487 | .403 | .473 | -.002 | .290 | 1 | 66 | .592 |
| 7 | .697[g] | .485 | .410 | .470 | -.002 | .245 | 1 | 67 | .622 |
| 8 | .694[h] | .482 | .415 | .468 | -.003 | .443 | 1 | 68 | .508 |
| 9 | .690[i] | .477 | .417 | .467 | -.005 | .731 | 1 | 69 | .396 |
| 10 | .686[j] | .471 | .418 | .467 | -.006 | .790 | 1 | 70 | .377 |
| 11 | .683[k] | .467 | .422 | .465 | -.004 | .540 | 1 | 71 | .465 |
| 12 | .671[l] | .450 | .413 | .469 | -.016 | 2.186 | 1 | 72 | .144 |

l. Predictors: (Constant), PLM5, PSSN1, SSSN1, PLM4, ISSN1
l. Predictors: (Constant), PLM5, PSSN1, SSSN1, PLM4, ISSN1

Table 9.7.1.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (11.968) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in social outcomes. Moreover, the Sum of Squares for this model is (13.150) and the residual value is (16.042), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (29.192). The degree of freedom for the model is ($df = 5$), while the mean squares is (2.630).

Table 9.7.1.2: ANOVA results for regression between the PLM and the SO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 13.150 | 5 | 2.630 | 11.968 | .000[b] |
| | Residual | 16.042 | 73 | .220 | | |
| | Total | 29.192 | 78 | | | |

a. Dependent Variable: Social

b. Predictors: (Constant), PLM4, SSSN1, PSSN1, PLM5, ISSN1

Table 9.7.1.3 presents the estimated coefficient values defining the contribution of each of the 5 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, ISSN1 “Accountability” has the highest positive impact than others (beta value = .294). It can be indicated that ISSN1 “Accountability” and PLM4 “We capture the lessons learned from our projects” are significant predictors for the dependent variable as their Sig value below .05 (Sig. < .05). Noticeably, it is shown in the table that some variables contribute positively (i.e. PLM5, PSSN1, SSSN1, ISSSN1) to the social outcomes, while others contribute negatively (i.e. PLM4) indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.7.1.3: Coefficient results for regression between the PLM and the SO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | T | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 1.029 | .520 | | 1.979 | .052 | -.007 | 2.065 | | | | | |
| | PLM5 | .101 | .055 | .207 | 1.820 | .073 | -.010 | .211 | .139 | .208 | .158 | .584 | 1.713 |
| | PSSN1 | .216 | .117 | .202 | 1.855 | .068 | -.016 | .449 | .479 | .212 | .161 | .634 | 1.577 |
| | SSSN1 | .265 | .139 | .237 | 1.898 | .062 | -.013 | .543 | .558 | .217 | .165 | .482 | 2.076 |
| | ISSN1 | .380 | .162 | .294 | 2.351 | .021 | .058 | .702 | .574 | .265 | .204 | .482 | 2.076 |
| | PLM4 | -.159 | .062 | -.290 | -2.564 | .012 | -.282 | -.035 | -.082 | -.287 | -.222 | .589 | 1.696 |

a. Dependent Variable: Social

Table 9.7.1.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 2 condition indices under 15, and 2 condition indices are in the usual rage of the threshold 15 to 30, and only 1 index exceeding the threshold of 30, and this accounted for dimension 6 at (37.751). This dimension has high linear dependence as two variables in the variance proportion accounted for .50 value or higher with a high condition index. However the tolerance values do not indicate multicollinearity. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.7.1.4: Collinearity diagnostics of the regression between the PLM and the SO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | PLM5 | PSSN1 | SSSN1 | ISSN1 | PLM4 |
| 1 | 1 | 5.839 | 1.000 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .105 | 7.453 | .01 | .27 | .01 | .01 | .00 | .11 |
| | 3 | .034 | 13.017 | .00 | .72 | .00 | .00 | .00 | .84 |
| | 4 | .009 | 24.826 | .42 | .00 | .73 | .00 | .02 | .00 |
| | 5 | .008 | 26.922 | .38 | .00 | .26 | .48 | .03 | .04 |
| | 6 | .004 | 37.751 | .19 | .00 | .01 | .51 | .95 | .00 |

a. Dependent Variable: Social

Table 9.7.1.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.7.1.5: Residuals statistics for regression between the PLM and the SO, mediating by IS

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.28 | 5.38 | 4.41 | .411 | 79 |
| Residual | -1.404 | 1.241 | .000 | .454 | 79 |
| Std. Predicted Value | -2.758 | 2.352 | .000 | 1.000 | 79 |
| Std. Residual | -2.994 | 2.646 | .000 | .967 | 79 |

a. Dependent Variable: Social

Figure 9.7.1.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.7.1.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

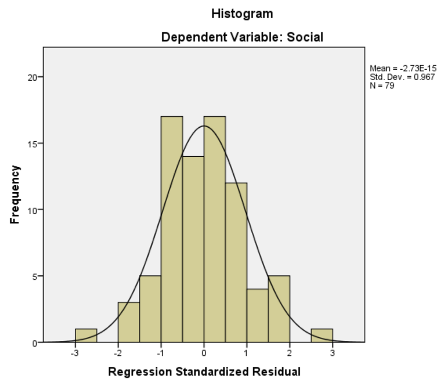



Figure 9.7.1.1: Histogram of the standardised residuals for regression between the PLM and the SO, mediating by IS

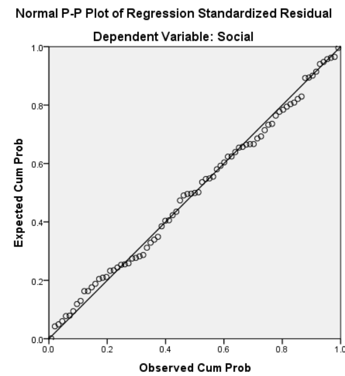



Figure 9.7.1.2: Normal P-P plot of regression standardised residual for regression between the PLM and the SO, mediating by IS

The relationship between social and PLM as derived by the multiple regression analysis is shown by the following equation:

Ysplm = 1.029 + .101 PLM5 + .216 PSSN1 + .065 SSSN1 + .380 ISSN1 - .159 PLM4

**9.7.2. Regression between Program Level Measurements and Social Outcomes, mediated by Innovation Skills:**

Table 9.7.2.1 is the model summary that represents the regression between program level measurements and social outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 15 models generated to examine the relationships between dependent, independent, using the mediator variables. The selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (16 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 16 variables and ended up with only 2 considered variables which are: SSSN1, ISSN1. The selected model for this regression is model number 15; the last generated model. Remarkably, this model has not considered any components from the independent variable due to their insignificance in the relationship with the dependent variable. This indicates that the social innovation outcome is not really explained by the program level measurement in this study.

The model summary table provides the overall persons correlation coefficient between the independent and dependent variables. In this case the multiple correlation is (.616) and the R Square value is (.379) and Adjusted R Square value is (.366). This means that there is a high degree of goodness of fit of the regression model between the selected mediator variables and dependent variable. In addition, R2 and adjusted R2 values indicate that over 36% of variance in the success of social outcomes could be explained by having the skills of augmentation and accountability.

Table 9.7.2.1: Model summary for regression between the PrLM and the SO, mediating by IS

**Model Summary**[p]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .707[a] | .500 | .371 | .485 | .500 | 3.875 | 16 | 62 | .000 |
| 2 | .707[b] | .500 | .381 | .481 | .000 | .000 | 1 | 62 | .993 |
| 3 | .707[c] | .499 | .390 | .478 | -.001 | .090 | 1 | 63 | .765 |
| 4 | .704[d] | .496 | .396 | .476 | -.003 | .386 | 1 | 64 | .537 |
| 5 | .702[e] | .493 | .400 | .474 | -.004 | .488 | 1 | 65 | .487 |
| 6 | .697[f] | .486 | .402 | .473 | -.006 | .787 | 1 | 66 | .378 |
| 7 | .692[g] | .479 | .403 | .473 | -.007 | .916 | 1 | 67 | .342 |
| 8 | .687[h] | .472 | .403 | .473 | -.008 | 1.008 | 1 | 68 | .319 |
| 9 | .680[i] | .462 | .401 | .473 | -.009 | 1.209 | 1 | 69 | .275 |
| 10 | .674[j] | .454 | .400 | .474 | -.009 | 1.148 | 1 | 70 | .288 |
| 11 | .664[k] | .441 | .395 | .476 | -.012 | 1.595 | 1 | 71 | .211 |
| 12 | .655[l] | .429 | .389 | .478 | -.013 | 1.643 | 1 | 72 | .204 |
| 13 | .648[m] | .419 | .388 | .479 | -.009 | 1.175 | 1 | 73 | .282 |
| 14 | .633[n] | .400 | .376 | .483 | -.019 | 2.431 | 1 | 74 | .123 |
| 15 | .616[o] | .379 | .363 | .488 | -.021 | 2.612 | 1 | 75 | .110 |

o. Predictors: (Constant), SSSN1, ISSN1

p. Dependent Variable: Social

Table 9.7.2.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (23.239) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in social outcomes. Moreover, the Sum of Squares for this model is (11.087) and the residual value is (18.114), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (29.192). The degree of freedom for the model is ($df = 2$), while the mean squares is (5.539).

Table 9.7.2.2: ANOVA results for regression between the PrLM and the SO, mediating by IS

**ANOVAa**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 15 | Regression | 11.078 | 2 | 5.539 | 23.239 | .000[p] |
| | Residual | 18.114 | 76 | .238 | | |
| | Total | 29.192 | 78 | | | |

a. Dependent Variable: Social

p. Predictors: (Constant), SSSN1, ISSN1

As this model has not considered any component from the independent variable (program level measurements), there will not be further analysis of this regression model. In this study, the results of statistical analyses has not proved the relationship between performance of program and the success of social innovation initiatives.

### 9.7.3. Regression between Portfolio Level Measurements and Social Outcomes, mediated by Innovation Skills:

Table 9.7.3.1 is the model summary that represents the regression between portfolio level measurements and social outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 10 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, therefore the selected model for this regression is model number 10; the last generated model. The statistics of those models will begin the calculation considering all entered variables (17 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 17 variables and ended up with only 8 variables which are: SSSN2, KSSN2, PoLM1, PSSN1, SSSN1, PoLM5, ISSN1, PoLM3. This model has R Square value of (.554) and Adjusted R Square value of (.504). This means that there is a high degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over 50% of variance in the success of social outcomes could be explained by the performance of portfolio taking into account the skills of idea creation, problem solving, augmentation, accountability, and management support.

Table 9.7.3.1: Model summary for regression between the PoLM and the SO, mediating by IS

**Model Summary**[k]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .769[a] | .592 | .478 | .442 | .592 | 5.203 | 17 | 61 | .000 |
| 2 | .769[b] | .592 | .486 | .438 | .000 | .003 | 1 | 61 | .953 |
| 3 | .769[c] | .591 | .494 | .435 | -.001 | .131 | 1 | 62 | .718 |
| 4 | .768[d] | .589 | .499 | .433 | -.002 | .274 | 1 | 63 | .602 |
| 5 | .766[e] | .586 | .503 | .431 | -.003 | .467 | 1 | 64 | .497 |
| 6 | .763[f] | .583 | .507 | .430 | -.003 | .538 | 1 | 65 | .466 |
| 7 | .761[g] | .579 | .509 | .429 | -.004 | .660 | 1 | 66 | .420 |
| 8 | .757[h] | .573 | .510 | .428 | -.005 | .874 | 1 | 67 | .353 |
| 9 | .750[i] | .562 | .505 | .430 | -.011 | 1.702 | 1 | 68 | .196 |
| 10 | .745[j] | .554 | .504 | .431 | -.008 | 1.253 | 1 | 69 | .267 |

j. Predictors: (Constant), SSSN2, KSSN2, PoLM1, PSSN1, SSSN1, PoLM5, ISSN1, PoLM3

k. Dependent Variable: Social

Table 9.7.3.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (10.888) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in social outcomes. Moreover, the Sum of Squares for this model is (16.185) and the residual value is (13.007), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (29.192). The degree of freedom for the model is ($df = 8$), while the mean squares is (2.023).

Table 9.7.3.2: ANOVA results for regression between the PoLM and the SO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 16.185 | 8 | 2.023 | 10.888 | .000[b] |
| | Residual | 13.007 | 70 | .186 | | |
| | Total | 29.192 | 78 | | | |

a. Dependent Variable: Social

b. Predictors: (Constant), SSSN2, PoLM1, KSSN2, PSSN1, PoLM5, SSSN1, ISSN1, PoLM3

Table 9.7.3.3 presents the estimated coefficient values defining the contribution of each of the 8 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, "PoLM1" has the highest positive impact than others (beta value = .351) while "PoLM5" has the highest negative impact (beta value = -.398). It can be indicated that most of the variables (PoLM1, PoLM5, KSSN2, ISSN1, SSSN1, SSSN2) are significant predictors for the dependent variable as their Sig value below .05 (Sig. < .05), except PSSN1 and PoLM3 are nearly significant with Sig vale of .078 and .051 respectively. Noticeably, it is shown in the table that some variables contribute positively (i.e. PoLM1, KSSN2, PSSN1, ISSSN1, SSSN1) to the social outcomes, while others contribute negatively (i.e. PoLM3, PoLM5, SSSN2) indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10 or VIF greater than 10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.7.3.3: Coefficient results for regression between the PoLM and the SO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | .859 | .503 | | 1.707 | .092 | -.145 | 1.863 | | | | | |
| | PoLM1 | .211 | .066 | .386 | 3.176 | .002 | .078 | .343 | .074 | .355 | .253 | .431 | 2.322 |
| | PoLM3 | -.127 | .064 | -.247 | -1.985 | .051 | -.254 | .001 | -.124 | -.231 | -.158 | .410 | 2.439 |
| | PoLM5 | -.225 | .063 | -.398 | -3.578 | .001 | -.350 | -.100 | -.174 | -.393 | -.285 | .514 | 1.944 |
| | KSSN2 | .324 | .115 | .298 | 2.808 | .006 | .094 | .554 | .327 | .318 | .224 | .566 | 1.768 |
| | PSSN1 | .194 | .108 | .181 | 1.787 | .078 | -.022 | .410 | .479 | .209 | .143 | .620 | 1.612 |
| | ISSN1 | .320 | .158 | .247 | 2.029 | .046 | .005 | .634 | .574 | .236 | .162 | .428 | 2.337 |
| | SSSN1 | .351 | .136 | .315 | 2.577 | .012 | .079 | .623 | .558 | .294 | .206 | .427 | 2.342 |
| | SSSN2 | -.243 | .105 | -.245 | -2.304 | .024 | -.453 | -.033 | .310 | -.265 | -.184 | .564 | 1.772 |

a. Dependent Variable: Social

Table 9.7.3.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 2 condition indices under 15, and 3 condition indices are in the usual rage of the threshold 15 to 30, and 3 indices exceeding the threshold of 30, and this accounted for dimension 6, 7, 8 at (32.680, 35.047, 47.641). Dimension 6 and 7 has no variance proportion above .50 this indicates no problem occurs with multicollinearity. While dimension 9 has high linear dependence as two variables in the variance proportion accounted for .50 or higher value with a high condition index. However the tolerance and the VIF values do not indicate multicollinearity. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.7.3.4: Collinearity diagnostics of the regression between the PoLM and the SO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | PoLM1 | PoLM3 | PoLM5 | KSSN2 | PSSN1 | ISSN1 | SSSN1 | SSSN2 |
| 1 | 1 | 8.706 | 1.000 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .169 | 7.183 | .00 | .06 | .08 | .05 | .00 | .00 | .00 | .00 | .01 |
| | 3 | .045 | 13.839 | .00 | .35 | .02 | .67 | .01 | .00 | .00 | .00 | .00 |
| | 4 | .039 | 15.028 | .00 | .31 | .65 | .15 | .01 | .00 | .00 | .00 | .00 |
| | 5 | .012 | 26.635 | .06 | .02 | .00 | .01 | .02 | .25 | .01 | .00 | .66 |
| | 6 | .010 | 29.817 | .28 | .13 | .19 | .01 | .27 | .28 | .00 | .05 | .08 |
| | 7 | .008 | 32.680 | .02 | .03 | .01 | .01 | .18 | .45 | .07 | .35 | .03 |
| | 8 | .007 | 35.047 | .55 | .10 | .04 | .03 | .46 | .00 | .02 | .10 | .21 |
| | 9 | .004 | 47.641 | .09 | .00 | .01 | .05 | .05 | .01 | .90 | .50 | .01 |

a. Dependent Variable: Social

Table 9.7.3.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.7.3.5: Residuals statistics for regression between the PoLM and the SO, mediating by IS

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.08 | 5.19 | 4.41 | .456 | 79 |
| Residual | -1.132 | 1.048 | .000 | .408 | 79 |
| Std. Predicted Value | -2.914 | 1.712 | .000 | 1.000 | 79 |
| Std. Residual | -2.625 | 2.431 | .000 | .947 | 79 |

a. Dependent Variable: Social

Figure 9.7.3.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.7.3.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

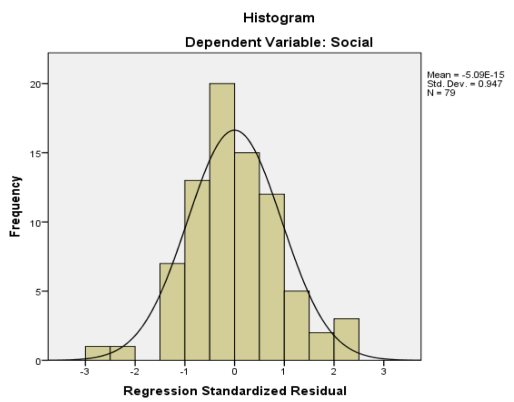



Figure 9.7.3.1: Histogram of the standardised residuals for regression between the PoLM and the SO, mediating by IS

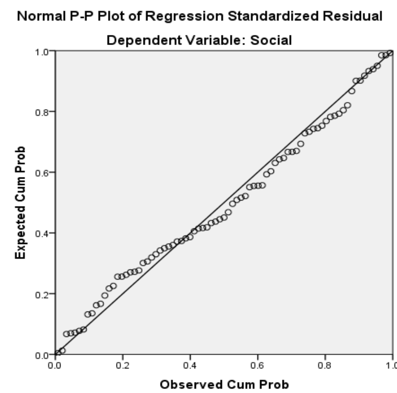



Figure 9.7.3.2: Normal P-P plot of regression standardised residual for regression between the PoLM and the SO, mediating by IS

The relationship between social and PoLM as derived by the multiple regression analysis is shown by the following equation:

$$Yspolm = 859 + .211\ PoLM1 - .127\ PoLM3 - .225\ PoLM5 + .324\ KSSN2 + .194\ PSSN1 + .320\ ISSN1 + .351\ SSSN1 - .243\ SSSN2$$

### 9.7.4. Regression between Strategy Level Measurements and Social Outcomes, mediated by Innovation Skills:

Table 9.7.4.1 is the model summary that represents the regression between strategy level measurements and social outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 20 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, therefore the selected model for this regression is model number 20; the last generated model. The statistics of those models will begin the calculation considering all entered variables (23 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 23 variables and ended up with only 4 variables which are: PSSN1, SSSN1, SLM3, ISSN1. This model has R Square value of (.445) and Adjusted R Square value of (.415). This means that there is a high degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over 40% of variance in the success of social outcomes could be explained by the performance of organisational strategy taking into account the skills of problem solving, augmentation, and accountability.

Table 9.7.4.1: Model summary for regression between the SLM and the SO, mediating by IS

**Model Summary[u]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .741[a] | .549 | .361 | .489 | .549 | 2.916 | 23 | 55 | .001 |
| 2 | .741[b] | .549 | .372 | .485 | .000 | .001 | 1 | 55 | .975 |
| 3 | .741[c] | .549 | .383 | .481 | .000 | .041 | 1 | 56 | .840 |
| 4 | .741[d] | .549 | .393 | .477 | -.001 | .067 | 1 | 57 | .797 |
| 5 | .739[e] | .547 | .401 | .474 | -.002 | .254 | 1 | 58 | .616 |
| 6 | .738[f] | .545 | .409 | .470 | -.001 | .183 | 1 | 59 | .671 |
| 7 | .738[g] | .544 | .417 | .467 | -.001 | .165 | 1 | 60 | .686 |
| 8 | .736[h] | .541 | .423 | .465 | -.003 | .361 | 1 | 61 | .550 |
| 9 | .733[i] | .537 | .427 | .463 | -.004 | .534 | 1 | 62 | .468 |
| 10 | .730[j] | .532 | .430 | .462 | -.005 | .659 | 1 | 63 | .420 |
| 11 | .726[k] | .528 | .433 | .461 | -.005 | .654 | 1 | 64 | .422 |
| 12 | .724[l] | .524 | .438 | .459 | -.003 | .476 | 1 | 65 | .493 |
| 13 | .722[m] | .521 | .443 | .457 | -.003 | .387 | 1 | 66 | .536 |
| 14 | .718[n] | .515 | .444 | .456 | -.006 | .880 | 1 | 67 | .352 |
| 15 | .710[o] | .504 | .440 | .458 | -.011 | 1.502 | 1 | 68 | .225 |
| 16 | .701[p] | .492 | .434 | .460 | -.013 | 1.788 | 1 | 69 | .186 |
| 17 | .694[q] | .482 | .431 | .461 | -.010 | 1.324 | 1 | 70 | .254 |
| 18 | .685[r] | .469 | .425 | .464 | -.013 | 1.724 | 1 | 71 | .193 |
| 19 | .679[s] | .461 | .424 | .464 | -.008 | 1.142 | 1 | 72 | .289 |
| 20 | .667[t] | .445 | .415 | .468 | -.016 | 2.222 | 1 | 73 | .140 |

t. Predictors: (Constant), PSSN1, SSSN1, SLM3, ISSN1

u. Dependent Variable: Social

Table 9.7.4.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (14.809) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in social outcomes. Moreover, the Sum of Squares for this model is (12.979) and the residual value is (16.213), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (29.192). The degree of freedom for the model is (df = 4), while the mean squares is (3.245).

Table 9.7.4.2: ANOVA results for regression between the SLM and the SO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 12.979 | 4 | 3.245 | 14.809 | .000[b] |
| | Residual | 16.213 | 74 | .219 | | |
| | Total | 29.192 | 78 | | | |

a. Dependent Variable: Social

b. Predictors: (Constant), ISSN1, SLM3, PSSN1, SSSN1

Table 9.7.4.3 presents the estimated coefficient values defining the contribution of each of the 4 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, "ISSN1" has the highest positive impact than others (beta value = .295) while "SLM3" has the negative impact (beta value = -.216). It can be indicated that most of the variables (SLM3, PSSN1, SSSN1) are significant predictors for the dependent variable as their Sig value below .05 (Sig. < .05), except ISSN1 which is nearly significant with Sig vale of (.061). Noticeably, it is shown in the table that some variables contribute positively (i.e. PSSN1, SSSN1, ISSN1) to the social outcomes, while SLM1 "Strategies are clear enough that we can translate it into innovation initiatives" contributes negatively indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10 or VIF greater than 10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.7.4.3: Coefficient results for regression between the SLM and the SO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 1.091 | .521 | | 2.095 | .040 | .053 | 2.129 | | | | | |
| | SLM3 | -.127 | .052 | -.216 | -2.428 | .018 | -.232 | -.023 | -.137 | -.272 | -.210 | .951 | 1.052 |
| | PSSN1 | .252 | .117 | .236 | 2.150 | .035 | .018 | .487 | .479 | .242 | .186 | .623 | 1.605 |
| | SSSN1 | .265 | .139 | .237 | 1.900 | .061 | -.013 | .542 | .558 | .216 | .165 | .482 | 2.077 |
| | ISSN1 | .382 | .161 | .295 | 2.367 | .021 | .060 | .703 | .574 | .265 | .205 | .482 | 2.073 |

a. Dependent Variable: Social

Table 9.7.4.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 1 condition index under 15, and 2 condition indices are in the usual rage of the threshold 15 to 30, and 1 index exceeding the threshold of 30, and this accounted for dimension 5 at (34.646). This dimension (#5) has high linear dependence as two variables in the variance proportion accounted for .50 or higher value with a high condition index. However the tolerance and the VIF values do not indicate multicollinearity. Therefore, the data accounts for no serious problem with multicollinearity in the model.

Table 9.7.4.4: Collinearity diagnostics of the regression between the SLM and the SO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | SLM3 | PSSN1 | SSSN1 | ISSN1 |
| 1 | 1 | 4.913 | 1.000 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .066 | 8.637 | .00 | .93 | .01 | .01 | .01 |
| | 3 | .010 | 22.731 | .46 | .00 | .67 | .00 | .01 |
| | 4 | .008 | 24.919 | .35 | .06 | .31 | .49 | .03 |
| | 5 | .004 | 34.646 | .19 | .00 | .01 | .50 | .95 |

a. Dependent Variable: Social

Table 9.7.4.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.7.4.5: Residuals statistics for regression between the SLM and the SO, mediating by IS

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.41 | 5.33 | 4.41 | .408 | 79 |
| Residual | -1.542 | 1.065 | .000 | .456 | 79 |
| Std. Predicted Value | -2.463 | 2.255 | .000 | 1.000 | 79 |
| Std. Residual | -3.294 | 2.275 | .000 | .974 | 79 |

a. Dependent Variable: Social

Figure 9.7.4.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.7.4.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

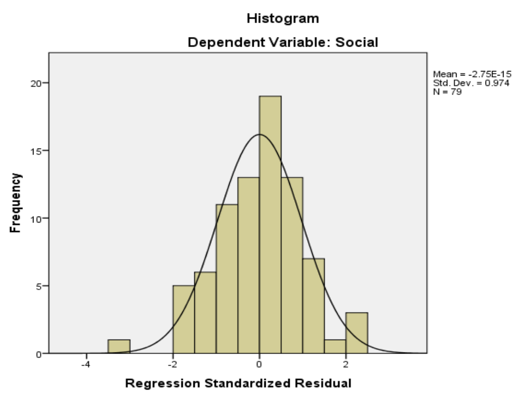



Figure 9.7.4.1: Histogram of the standardised residuals for regression between the SLM and the SO, mediating by IS

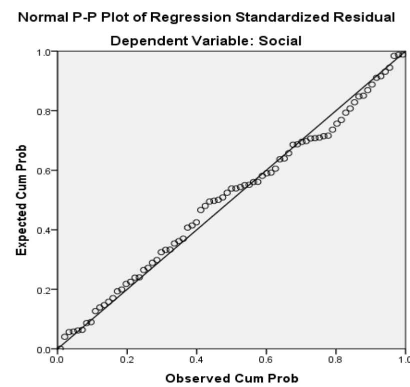



Figure 9.7.4.2: Normal P-P plot of regression standardised residual for regression between the SLM and the SO, mediating by IS

The relationship between social and SLM as derived by the multiple regression analysis is shown by the following equation:

Ysslm = 1.091 - .127 SLM3 + .252 PSSN1 + .265 SSSN1 + .382 ISSN1

### 9.7.5. Regression between Government Council Level Measurements and Social Outcomes, mediated by Innovation Skills:

Table 9.7.5.1 is the model summary that represents the regression between government council level measurements and social outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 13 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, therefore the selected model for this regression is model number 13; the last generated model. The statistics of those models will begin the calculation considering all entered variables (16 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 16 variables and ended up with only 4 variables which are: PSSN1, SSSN1, ISSN1, GCLM1. This model has R Square value of (.431) and Adjusted R Square value of (.400). This means that there is a high degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that almost 40% of variance in the success of social outcomes could be explained by the performance of government council taking into account the skills of problem solving, accountability, and augmentation

Table 9.7.5.1: Model summary for regression between the GCLM and the SO, mediating by IS

**Model Summary[n]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .706[a] | .498 | .368 | .486 | .498 | 3.841 | 16 | 62 | .000 |
| 2 | .706[b] | .498 | .378 | .482 | .000 | .000 | 1 | 62 | .989 |
| 3 | .706[c] | .498 | .388 | .479 | .000 | .005 | 1 | 63 | .946 |
| 4 | .704[d] | .496 | .395 | .476 | -.002 | .205 | 1 | 64 | .652 |
| 5 | .702[e] | .493 | .400 | .474 | -.003 | .443 | 1 | 65 | .508 |
| 6 | .700[f] | .490 | .406 | .472 | -.003 | .416 | 1 | 66 | .521 |
| 7 | .697[g] | .487 | .411 | .470 | -.003 | .395 | 1 | 67 | .532 |
| 8 | .695[h] | .482 | .415 | .468 | -.004 | .532 | 1 | 68 | .468 |
| 9 | .690[i] | .476 | .417 | .467 | -.006 | .800 | 1 | 69 | .374 |
| 10 | .685[j] | .469 | .417 | .467 | -.007 | .952 | 1 | 70 | .333 |
| 11 | .677[k] | .459 | .414 | .468 | -.010 | 1.390 | 1 | 71 | .242 |
| 12 | .667[l] | .444 | .406 | .471 | -.015 | 1.955 | 1 | 72 | .166 |
| 13 | .656[m] | .431 | .400 | .474 | -.013 | 1.754 | 1 | 73 | .190 |

m. Predictors: (Constant), PSSN1, SSSN1, ISSN1, GCLM1

n. Dependent Variable: Social

Table 9.7.3.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (14.010) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in social outcomes. Moreover, the Sum of Squares for this model is (12.580) and the residual value is (16.612), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (29.192). The degree of freedom for the model is ($df = 4$), while the mean squares is (3.145).

Table 9.7.5.2: ANOVA results for regression between the GCLM and the SO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 12.580 | 4 | 3.145 | 14.010 | .000[b] |
| | Residual | 16.612 | 74 | .224 | | |
| | Total | 29.192 | 78 | | | |

a. Dependent Variable: Social

b. Predictors: (Constant), ISSN1, GCLM1, PSSN1, SSSN1

Table 9.7.5.3 presents the estimated coefficient values defining the contribution of each of the 4 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, "SSSN1" has the highest positive impact than others (beta value = .270). It can be indicated that most of the variables (GCLM1, SSSN1, ISSN1) are significant predictors for the dependent variable as their Sig value below .05 (Sig. < .05), except PSSN1 which is nearly significant with Sig vale of .066. Noticeably, it is shown in the table that some variables contribute positively (i.e. PSSN1, SSSN1, ISSN1) to the social outcomes, while GCLM1 contributes negatively indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10 or VIF greater than 10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.7.5.3: Coefficient results for regression between the GCLM and the SO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 1.154 | .544 | | 2.121 | .037 | .070 | 2.237 | | | | | |
| | GCLM1 | -.098 | .049 | -.178 | -1.994 | .050 | -.197 | .000 | -.169 | -.226 | -.175 | .970 | 1.031 |
| | PSSN1 | .218 | .117 | .204 | 1.869 | .066 | -.014 | .451 | .479 | .212 | .164 | .644 | 1.552 |
| | SSSN1 | .301 | .141 | .270 | 2.133 | .036 | .020 | .583 | .558 | .241 | .187 | .480 | 2.085 |
| | ISSN1 | .343 | .165 | .265 | 2.079 | .041 | .014 | .672 | .574 | .235 | .182 | .472 | 2.120 |

a. Dependent Variable: Social

Table 9.7.5.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 1 condition index under 15, and 2 condition indices are in the usual rage of the threshold 15 to 30, and 1 index exceeding the threshold of 30, and this accounted for dimension 5 at (35.297). This Dimension has only 1 variance proportion above .50 this indicates no problem occurs with multicollinearity. In addition the tolerance and the VIF values do not indicate multicollinearity. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.7.5.4: Collinearity diagnostics of the regression between the GCLM and the SO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | GCLM1 | PSSN1 | SSSN1 | ISSN1 |
| 1 | 1 | 4.905 | 1.000 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .073 | 8.171 | .00 | .90 | .01 | .01 | .01 |
| | 3 | .009 | 22.826 | .34 | .01 | .80 | .00 | .02 |
| | 4 | .008 | 24.680 | .41 | .04 | .18 | .51 | .02 |
| | 5 | .004 | 35.297 | .25 | .05 | .01 | .48 | .95 |

a. Dependent Variable: Social

Table 9.7.5.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.7.5.5: Residuals statistics for regression between the GCLM and the SO, mediating by IS

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.45 | 5.27 | 4.41 | .402 | 79 |
| Residual | -1.581 | .967 | .000 | .461 | 79 |
| Std. Predicted Value | -2.397 | 2.145 | .000 | 1.000 | 79 |
| Std. Residual | -3.336 | 2.041 | .000 | .974 | 79 |

a. Dependent Variable: Social

Figure 9.7.5.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.7.5.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

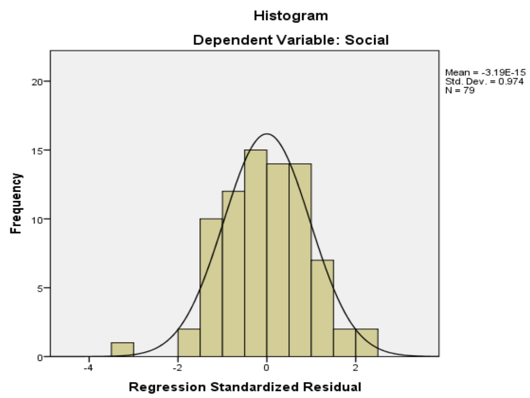



Figure 9.7.5.1: Histogram of the standardised residuals for regression between the GCLM and the SO, mediating by IS

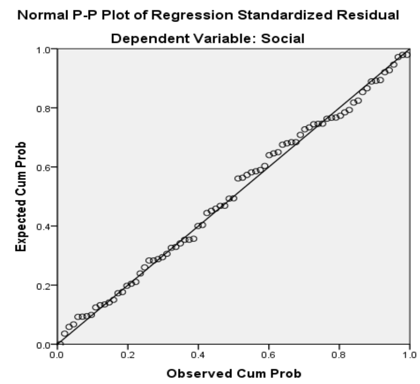



Figure 9.7.5.2: Normal P-P plot of regression standardised residual for regression between the GCLM and the SO, mediating by IS

The relationship between social and GCLM as derived by the multiple regression analysis is shown by the following equation:

Ysgclm = 1.154 - .098 GCLM1 + .218 PSSN1 + .301 SSSN1 + .343 ISSN1

## 9.8. Modelling the impact of performance level measurements factors on the success of economic innovation initiatives

This sections undergo the second cycle of regression analyses focusing on the impact of the performance of each identified level particularly on the success of economic innovation initiatives. The analyses of the relationships and the predictions will take into consideration the mediation effect of the skills required at each stage of the innovation process to diffuse innovation strategy in the public sector.

### 9.8.1. Regression between Project Level Measurements and Economic Outcomes, mediated by Innovation Skills:

Table 9.8.1.1 is the model summary that represents the regression between project level measurements and economic outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 14 models generated to examine the relationships between dependent, independent, using the mediator variables. The selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (16 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 16 variables and ended up with only 3 considered variables which are: ISSN2, PSSN1, SSSN1. The selected model for this regression is model number 14; the last generated model. Remarkably, this model has not considered any components from the independent variable due to their insignificance in the relationship with the dependent variable. Statistically, this indicates that the success in economic initiatives is not really explained by the variables used in this study to measure the performance on project level. The model summary table provides the overall persons correlation coefficient between the independent and dependent variables. In this case the multiple correlation is (.647) and the R Square value is

(.418) and Adjusted R Square value is (.395). This means that there is a high degree of goodness of fit of the regression model between the selected mediator variables and dependent variable. In addition, R2 and adjusted R2 values indicate that over 39% of variance in the success of economic outcomes could be explained by having the skills of leadership, problem solving, and augmentation.

Table 9.8.1.1: Model summary for regression between the PLM and the EO, mediating by IS

**Model Summary[o]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .701[a] | .492 | .361 | .539 | .492 | 3.752 | 16 | 62 | .000 |
| 2 | .701[b] | .492 | .371 | .535 | .000 | .019 | 1 | 62 | .891 |
| 3 | .701[c] | .492 | .380 | .531 | .000 | .031 | 1 | 63 | .860 |
| 4 | .701[d] | .491 | .390 | .527 | .000 | .030 | 1 | 64 | .864 |
| 5 | .700[e] | .490 | .397 | .523 | -.001 | .154 | 1 | 65 | .696 |
| 6 | .699[f] | .488 | .405 | .520 | -.002 | .207 | 1 | 66 | .651 |
| 7 | .698[g] | .487 | .411 | .517 | -.002 | .242 | 1 | 67 | .624 |
| 8 | .696[h] | .484 | .417 | .515 | -.002 | .287 | 1 | 68 | .594 |
| 9 | .691[i] | .477 | .418 | .515 | -.007 | .956 | 1 | 69 | .332 |
| 10 | .686[j] | .471 | .419 | .514 | -.006 | .840 | 1 | 70 | .363 |
| 11 | .678[k] | .460 | .414 | .516 | -.012 | 1.552 | 1 | 71 | .217 |
| 12 | .668[l] | .446 | .408 | .519 | -.014 | 1.834 | 1 | 72 | .180 |
| 13 | .662[m] | .439 | .409 | .519 | -.007 | .903 | 1 | 73 | .345 |
| 14 | .647[n] | .418 | .395 | .525 | -.021 | 2.735 | 1 | 74 | .102 |

n. Predictors: (Constant), ISSN2, PSSN1, SSSN1

o. Dependent Variable: Economic

Table 9.8.2.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (15.874) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in economic outcomes. Moreover, the Sum of Squares for this model is (13.774) and the residual value is (21.694), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (35.468). The degree of freedom for the model is ($df = 3$), while the mean squares is (4.591).

Table 9.8.2.2: ANOVA results for regression between the PLM and the EO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 13.774 | 3 | 4.591 | 15.874 | .000[b] |
| | Residual | 21.694 | 75 | .289 | | |
| | Total | 35.468 | 78 | | | |

a. Dependent Variable: Economic

b. Predictors: (Constant), SSSN1, PSSN1, ISSN1

As this model has not considered any component from the independent variable (project level measurements), there will not be further analysis of this regression model. In this study, the results of statistical analyses has not proved the relationship between performance of project and the success of economic innovation initiatives.

### 9.8.2. Regression between Program Level Measurements and Economic Outcomes, mediated by Innovation Skills:

Table 9.8.2.1 is the model summary that represents the regression between program level measurements and economic outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 12 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (16 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 16 variables and ended up with only 5 variables which are: ISSN2, PrLM1, PSSN1, SSSN1, PrLM2. The selected model for this regression is model number 12; the last generated model due to the application of backward method. The variation in economic innovation success can be explained by the model comprised of the two independent and 3 mediator variables. In this case the multiple correlation is (.676) and the R Square value is (.457) and Adjusted R Square value is (.420). This means that there is a high degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over 42% of variance in the success of economic outcomes could be explained by the performance of program taking into account the skills of leadership, problem solving, and augmentation.

Table 9.8.2.1: Model summary for regression between the PrLM and the EO, mediating by IS

**Model Summary[m]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .720[a] | .518 | .394 | .525 | .518 | 4.171 | 16 | 62 | .000 |
| 2 | .720[b] | .518 | .404 | .521 | .000 | .003 | 1 | 62 | .956 |
| 3 | .720[c] | .518 | .413 | .517 | .000 | .028 | 1 | 63 | .867 |
| 4 | .720[d] | .518 | .421 | .513 | .000 | .031 | 1 | 64 | .861 |
| 5 | .718[e] | .515 | .427 | .510 | -.003 | .368 | 1 | 65 | .546 |
| 6 | .717[f] | .514 | .434 | .507 | -.001 | .173 | 1 | 66 | .679 |
| 7 | .714[g] | .510 | .438 | .505 | -.004 | .525 | 1 | 67 | .471 |
| 8 | .710[h] | .504 | .439 | .505 | -.006 | .892 | 1 | 68 | .348 |
| 9 | .704[i] | .496 | .438 | .505 | -.008 | 1.091 | 1 | 69 | .300 |
| 10 | .698[j] | .488 | .437 | .506 | -.008 | 1.126 | 1 | 70 | .292 |
| 11 | .689[k] | .474 | .430 | .509 | -.013 | 1.866 | 1 | 71 | .176 |
| 12 | .676[l] | .457 | .420 | .513 | -.017 | 2.303 | 1 | 72 | .134 |

l. Predictors: (Constant), ISSN2, PrLM1, PSSN1, SSSN1, PrLM2

m. Dependent Variable: Economic

Table 9.8.2.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (12.309) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in economic outcomes. Moreover, the Sum of Squares for this model is (16.224) and the residual value is (19.244), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (35.468). The degree of freedom for the model is (df = 5), while the mean squares is (3.245).

Table 9.8.2.2: ANOVA results for regression between the PrLM and the EO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 16.224 | 5 | 3.245 | 12.309 | .000[b] |
| | Residual | 19.244 | 73 | .264 | | |
| | Total | 35.468 | 78 | | | |

a. Dependent Variable: Economic

b. Predictors: (Constant), SSSN1, PrLM1, ISSN2, PSSN1, PrLM2

Table 9.8.2.3 presents the estimated coefficient values defining the contribution of each of the 5 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, SSSN1 “augmentation” has the highest positive impact than others (beta value = .340). It can be indicated that almost all variables (ISSN2, PSSN1, SSSN1, PrLM2) are significant predictors for the dependent variable as their Sig value below .05 (Sig. < .05), except PrLM1 which is nearly significant at Sig value of (.072). Noticeably, it is shown in the table that some variables contribute positively (i.e. ISSN2, PSSN1, SSSN1, PrLM2) to the economic outcomes, while only one variable contribute negatively (i.e. PrLM1) indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.8.2.3: Coefficient results for regression between the PrLM and the EO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | .575 | .521 | | 1.105 | .273 | -.462 | 1.613 | | | | | |
| | PrLM1 | -.118 | .064 | -.201 | -1.828 | .072 | -.246 | .011 | .039 | -.209 | -.158 | .615 | 1.627 |
| | PrLM2 | .150 | .069 | .247 | 2.188 | .032 | .013 | .286 | .247 | .248 | .189 | .583 | 1.715 |
| | PSSN1 | .274 | .131 | .232 | 2.098 | .039 | .014 | .534 | .520 | .238 | .181 | .606 | 1.649 |
| | ISSN2 | .207 | .086 | .226 | 2.396 | .019 | .035 | .379 | .413 | .270 | .207 | .832 | 1.202 |
| | SSSN1 | .418 | .128 | .340 | 3.255 | .002 | .162 | .674 | .559 | .356 | .281 | .681 | 1.468 |

a. Dependent Variable: Economic

Table 9.8.2.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 2 condition indices under 15, and 3 condition indices are in the usual rage of the threshold 15 to 30, and the model has no any indices exceeding the threshold of 30. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.8.2.4: Collinearity diagnostics of the regression between the PrLM and the EO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | PrLM1 | PrLM2 | PSSN1 | ISSN2 | SSSN1 |
| 1 | 1 | 5.809 | 1.000 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .116 | 7.091 | .01 | .20 | .15 | .00 | .04 | .01 |
| | 3 | .040 | 12.077 | .00 | .78 | .77 | .00 | .00 | .00 |
| | 4 | .019 | 17.549 | .05 | .01 | .06 | .05 | .94 | .10 |
| | 5 | .009 | 25.061 | .81 | .00 | .01 | .44 | .00 | .04 |
| | 6 | .008 | 27.456 | .13 | .01 | .01 | .50 | .01 | .86 |

a. Dependent Variable: Economic

Table 9.8.2.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.8.2.5: Residuals statistics for regression between the PrLM and the EO, mediating by IS

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.21 | 5.20 | 4.36 | .456 | 79 |
| Residual | -1.399 | 1.492 | .000 | .497 | 79 |
| Std. Predicted Value | -2.534 | 1.831 | .000 | 1.000 | 79 |
| Std. Residual | -2.726 | 2.906 | .000 | .967 | 79 |

a. Dependent Variable: Economic

Figure 9.8.2.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.8.2.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

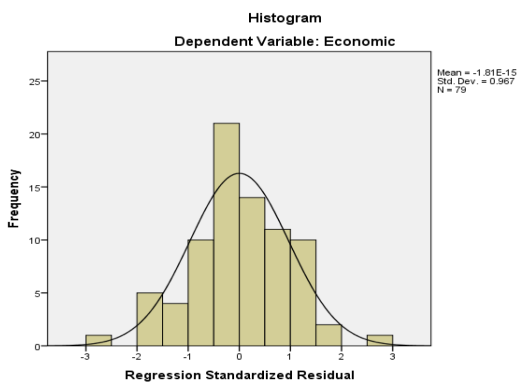



Figure 9.8.2.1: Histogram of the standardised residuals for regression between the PrLM and the EO, mediating by IS

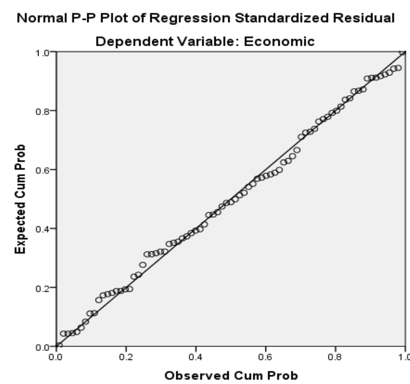



Figure 9.8.2.2: Normal P-P plot of regression standardised residual for regression between the PrLM and the EO, mediating by IS

The relationship between economic and PrLM as derived by the multiple regression analysis is shown by the following equation:

Yeprlm = .575 - .118 PrLM1 + .150 PrLM2 + .274 PSSN1 + .207 ISSN2 + .418 SSSN1

**9.8.3. Regression between Portfolio Level Measurements and Economic Outcomes, mediated by Innovation Skills:**

Table 9.8.3.1 is the model summary that represents the regression between portfolio level measurements and economic outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 11 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (17 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 17 variables and ended up with only 7 variables which are: PoLM6, PoLM1, ISSN2, KSSN1, SSSN1, PoLM5, PoLM3. The selected model for this regression is model number 11; the last generated model due to the application of backward method. The variation in economic innovation success can be explained by the model comprised of the 4 independent and 3 mediator variables. In this case the multiple correlation is (.751) and the R Square value is (.563) and Adjusted R Square value is (.520). This means that there is a high degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over 52% of variance in the success of economic outcomes could be explained by the performance of portfolio taking into account the skills of leadership, risk-taking, and augmentation.

Table 9.8.3.1: Model summary for regression between the PoLM and the EO, mediating by IS

**Model Summary**[l]

| | | | | | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .771[a] | .594 | .481 | .486 | .594 | 5.257 | 17 | 61 | .000 |
| 2 | .771[b] | .594 | .490 | .482 | .000 | .003 | 1 | 61 | .957 |
| 3 | .771[c] | .594 | .498 | .478 | .000 | .023 | 1 | 62 | .880 |
| 4 | .771[d] | .594 | .505 | .474 | .000 | .040 | 1 | 63 | .842 |
| 5 | .770[e] | .593 | .512 | .471 | .000 | .074 | 1 | 64 | .786 |
| 6 | .769[f] | .592 | .518 | .468 | -.001 | .227 | 1 | 65 | .635 |
| 7 | .768[g] | .590 | .522 | .466 | -.002 | .379 | 1 | 66 | .541 |
| 8 | .765[h] | .585 | .524 | .465 | -.005 | .790 | 1 | 67 | .377 |
| 9 | .761[i] | .579 | .524 | .465 | -.006 | .941 | 1 | 68 | .335 |
| 10 | .757[j] | .572 | .524 | .465 | -.007 | 1.094 | 1 | 69 | .299 |
| 11 | .751[k] | .563 | .520 | .467 | -.009 | 1.489 | 1 | 70 | .226 |

k. Predictors: (Constant), PoLM6, PoLM1, ISSN2, KSSN1, SSSN1, PoLM5, PoLM3
l. Dependent Variable: Economic

Table 9.8.3.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (13.083) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in economic outcomes. Moreover, the Sum of Squares for this model is (19.979) and the residual value is (15.489), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (35.468). The degree of freedom for the model is ($df = 7$), while the mean squares is (2.854).

Table 9.8.3.2: ANOVA results for regression between the PoLM and the EO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 19.979 | 7 | 2.854 | 13.083 | .000[b] |
| | Residual | 15.489 | 71 | .218 | | |
| | Total | 35.468 | 78 | | | |

a. Dependent Variable: Economic

b. Predictors: (Constant), PoLM3, SSSN1, ISSN2, KSSN1, PoLM5, PoLM1, PoLM6

Table 9.8.3.3 presents the estimated coefficient values defining the contribution of each of the 7 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, PoLM1 “Ideas in portfolio are evaluated to ensure the balance of projects in terms of their timing, technical complexity, expected market impact and risk level” has the highest positive impact than others (beta value = .400). It can be indicated that all variables are significant predictors for the dependent variable as their Sig value below .05 (Sig. < .05). Noticeably, it is shown in the table that some variables contribute positively (i.e. PoLM3, SSSN1, ISSN2, KSSN1, PoLM5) to the economic outcomes, while only one variable contribute negatively (i.e. PoLM1, PoLM6) indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.8.3.3: Coefficient results for regression between the PoLM and the EO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | .600 | .500 | | 1.201 | .234 | -.396 | 1.597 | | | | | |
| | PoLM6 | .178 | .070 | .292 | 2.550 | .013 | .039 | .317 | .063 | .290 | .200 | .470 | 2.126 |
| | PoLM1 | .241 | .066 | .400 | 3.638 | .001 | .109 | .372 | .158 | .396 | .285 | .510 | 1.962 |
| | ISSN2 | .172 | .079 | .189 | 2.175 | .033 | .014 | .330 | .413 | .250 | .171 | .818 | 1.222 |
| | KSSN1 | .318 | .104 | .279 | 3.062 | .003 | .111 | .526 | .455 | .342 | .240 | .740 | 1.352 |
| | SSSN1 | .432 | .110 | .351 | 3.923 | .000 | .212 | .651 | .559 | .422 | .308 | .768 | 1.302 |
| | PoLM5 | -.220 | .073 | -.353 | -3.029 | .003 | -.364 | -.075 | -.086 | -.338 | -.238 | .454 | 2.205 |
| | PoLM3 | -.223 | .069 | -.394 | -3.211 | .002 | -.361 | -.084 | -.128 | -.356 | -.252 | .408 | 2.450 |

a. Dependent Variable: Economic

Table 9.8.3.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 3 condition indices under 15, and 5 condition indices are in the usual rage of the threshold 15 to 30, and the model has no any indices exceeding the threshold of 30. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.8.3.4: Collinearity diagnostics of the regression between the PoLM and the EO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | PoLM6 | PoLM1 | ISSN2 | KSSN1 | SSSN1 | PoLM5 | PoLM3 |
| 1 | 1 | 7.677 | 1.000 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .162 | 6.893 | .01 | .03 | .03 | .03 | .01 | .01 | .03 | .05 |
| | 3 | .057 | 11.609 | .00 | .31 | .43 | .00 | .00 | .00 | .08 | .05 |
| | 4 | .038 | 14.181 | .00 | .06 | .16 | .00 | .00 | .00 | .50 | .49 |
| | 5 | .029 | 16.285 | .00 | .54 | .38 | .01 | .00 | .00 | .38 | .33 |
| | 6 | .019 | 20.330 | .04 | .05 | .00 | .95 | .08 | .10 | .00 | .01 |
| | 7 | .010 | 27.473 | .06 | .01 | .01 | .00 | .88 | .35 | .00 | .04 |
| | 8 | .008 | 30.843 | .88 | .00 | .00 | .01 | .03 | .53 | .00 | .02 |

a. Dependent Variable: Economic

Table 9.8.3.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.8.3.5: Residuals statistics for regression between the PoLM and the EO, mediating by IS

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 2.40 | 5.32 | 4.36 | .506 | 79 |
| Residual | -1.122 | 1.042 | .000 | .446 | 79 |
| Std. Predicted Value | -3.877 | 1.893 | .000 | 1.000 | 79 |
| Std. Residual | -2.402 | 2.231 | .000 | .954 | 79 |

a. Dependent Variable: Economic

Figure 9.8.3.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.8.3.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

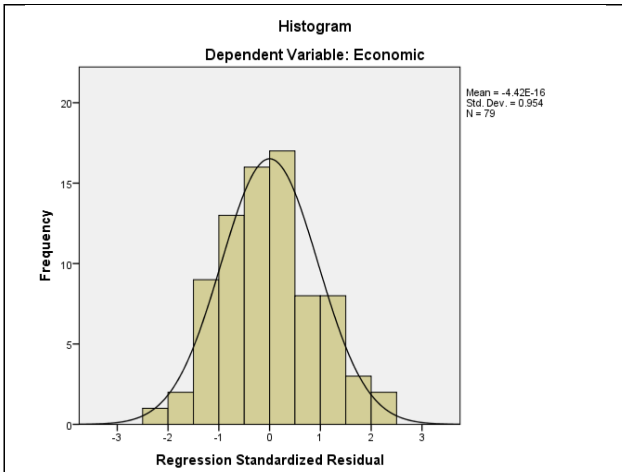



Figure 9.8.3.1: Histogram of the standardised residuals for regression between the PoLM and the EO, mediating by IS

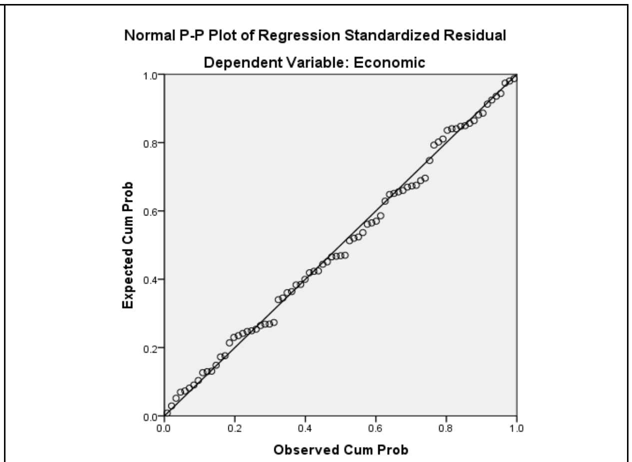



Figure 9.8.3.2: Normal P-P plot of regression standardised residual for regression between the PoLM and the EO, mediating by IS

The relationship between economic and PoLM as derived by the multiple regression analysis is shown by the following equation:

Yepolm = .600 + .178 PoLM6 + .241 PoLM1 + .172 ISSN2 + .318 KSSN1 + .418 SSSN1 + .432 SSSN1 - .220 PoLM5 - .223 PoLM3

### 9.8.4. Regression between Strategy Level Measurements and Economic Outcomes, mediated by Innovation Skills:

Table 9.8.4.1 is the model summary that represents the regression between strategy level measurements and economic outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 18 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (23 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 23 variables and ended up with only 6 variables which are: SLM4, ISSN2, PSSN1, SSSN1, SLM11, SLM6. The selected model for this regression is model number 18; the last generated model due to the application of backward method. The variation in economic innovation success can be explained by the model comprised of the 3 independent and 3 mediator variables. In this case the multiple correlation is (.686) and the R Square value is (.471) and Adjusted R Square value is (.427). This means that there is a high degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over 42% of variance in the success of economic outcomes could be explained by the performance of organisational strategy taking into account the skills of leadership, problem solving, and augmentation.

Table 9.8.4.1: Model summary for regression between the SLM and the EO, mediating by IS

**Model Summary**[s]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .727[a] | .528 | .330 | .552 | .528 | 2.674 | 23 | 55 | .001 |
| 2 | .727[b] | .528 | .342 | .547 | .000 | .003 | 1 | 55 | .954 |
| 3 | .726[c] | .528 | .354 | .542 | .000 | .006 | 1 | 56 | .938 |
| 4 | .726[d] | .528 | .365 | .538 | .000 | .031 | 1 | 57 | .861 |
| 5 | .726[e] | .527 | .375 | .533 | .000 | .046 | 1 | 58 | .831 |
| 6 | .726[f] | .527 | .385 | .529 | -.001 | .065 | 1 | 59 | .799 |
| 7 | .725[g] | .526 | .394 | .525 | -.001 | .079 | 1 | 60 | .780 |
| 8 | .725[h] | .525 | .402 | .521 | -.001 | .143 | 1 | 61 | .707 |
| 9 | .724[i] | .524 | .411 | .518 | -.001 | .109 | 1 | 62 | .743 |
| 10 | .723[j] | .523 | .419 | .514 | -.001 | .125 | 1 | 63 | .725 |
| 11 | .722[k] | .521 | .426 | .511 | -.002 | .247 | 1 | 64 | .621 |
| 12 | .721[l] | .520 | .433 | .508 | -.001 | .171 | 1 | 65 | .681 |
| 13 | .718[m] | .516 | .436 | .506 | -.004 | .561 | 1 | 66 | .457 |
| 14 | .715[n] | .511 | .439 | .505 | -.005 | .699 | 1 | 67 | .406 |
| 15 | .711[o] | .506 | .441 | .504 | -.005 | .719 | 1 | 68 | .399 |
| 16 | .705[p] | .497 | .439 | .505 | -.009 | 1.267 | 1 | 69 | .264 |
| 17 | .696[q] | .484 | .433 | .508 | -.012 | 1.713 | 1 | 70 | .195 |
| 18 | .686[r] | .471 | .427 | .511 | -.013 | 1.846 | 1 | 71 | .179 |

r. Predictors: (Constant), SLM4, ISSN2, PSSN1, SSSN1, SLM11, SLM6
s. Dependent Variable: Economic

Table 9.8.4.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (10.681) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in economic outcomes. Moreover, the Sum of Squares for this model is (16.703) and the residual value is (18.765), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (35.468). The degree of freedom for the model is ($df = 6$), while the mean squares is (2.784).

Table 9.8.4.2: ANOVA results for regression between the SLM and the EO, mediating by IS

**ANOVA**[a]

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 16.703 | 6 | 2.784 | 10.681 | .000[b] |
| | Residual | 18.765 | 72 | .261 | | |
| | Total | 35.468 | 78 | | | |

a. Dependent Variable: Economic

b. Predictors: (Constant), SLM6, ISSN2, SSSN1, SLM11, PSSN1, SLM4

Table 9.8.4.3 presents the estimated coefficient values defining the contribution of each of the 6 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, SSSN1 “augmentation” has the highest positive impact than others (beta value = .387). It can be indicated that “SSSN1” is highly significant variable with Sig value of (.000), while other variables are significant predictors as well for the dependent variable as their Sig value below .05 (Sig. < .05), except SLM4, SLM11 and PSSN1 which are nearly significant. Noticeably, it is shown in the table that almost all variables contribute positively to the economic outcomes, while only SLM6 contribute negatively, indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.8.4.3: Coefficient results for regression between the SLM and the EO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | .471 | .517 | | .910 | .366 | -.561 | 1.502 | | | | | |
| | SLM4 | .104 | .062 | .198 | 1.684 | .096 | -.019 | .227 | .169 | .195 | .144 | .534 | 1.873 |
| | ISSN2 | .196 | .086 | .214 | 2.281 | .026 | .025 | .366 | .413 | .260 | .196 | .832 | 1.202 |
| | PSSN1 | .250 | .129 | .212 | 1.935 | .057 | -.008 | .507 | .520 | .222 | .166 | .614 | 1.628 |
| | SSSN1 | .476 | .130 | .387 | 3.671 | .000 | .218 | .735 | .559 | .397 | .315 | .661 | 1.514 |
| | SLM11 | .123 | .069 | .194 | 1.789 | .078 | -.014 | .259 | .229 | .206 | .153 | .623 | 1.606 |
| | SLM6 | -.177 | .076 | -.303 | -2.338 | .022 | -.329 | -.026 | .072 | -.266 | -.200 | .437 | 2.291 |

a. Dependent Variable: Economic

Table 9.8.4.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 3 condition indices under 15, and 3 condition indices are in the usual rage of the threshold 15 to 30, and the model has no any indices exceeding the threshold of 30. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.8.4.4: Collinearity diagnostics of the regression between the SLM and the EO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | SLM4 | ISSN2 | PSSN1 | SSSN1 | SLM11 | SLM6 |
| 1 | 1 | 6.737 | 1.000 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .135 | 7.067 | .01 | .11 | .04 | .01 | .01 | .07 | .06 |
| | 3 | .062 | 10.425 | .00 | .34 | .00 | .00 | .00 | .71 | .01 |
| | 4 | .031 | 14.752 | .00 | .53 | .01 | .00 | .00 | .16 | .85 |
| | 5 | .019 | 18.975 | .05 | .00 | .94 | .07 | .08 | .01 | .06 |
| | 6 | .009 | 26.970 | .83 | .00 | .01 | .43 | .04 | .01 | .00 |
| | 7 | .008 | 29.761 | .11 | .02 | .00 | .50 | .87 | .04 | .03 |

a. Dependent Variable: Economic

Table 9.8.4.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.8.4.5: Residuals statistics for regression between the SLM and the EO, mediating by IS

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.22 | 5.63 | 4.36 | .463 | 79 |
| Residual | -1.327 | 1.118 | .000 | .490 | 79 |
| Std. Predicted Value | -2.463 | 2.742 | .000 | 1.000 | 79 |
| Std. Residual | -2.600 | 2.189 | .000 | .961 | 79 |

a. Dependent Variable: Economic

Figure 9.8.4.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.8.4.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

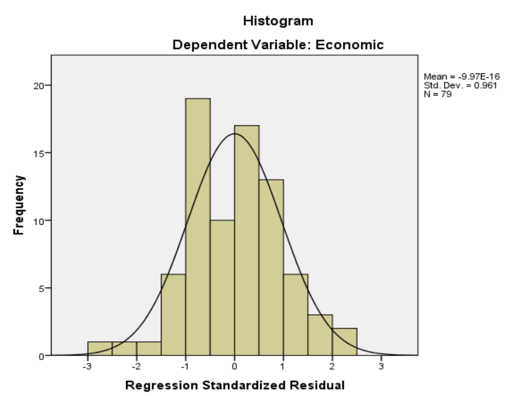



Figure 9.8.4.1: Histogram of the standardised residuals for regression between the SLM and the EO, mediating by IS

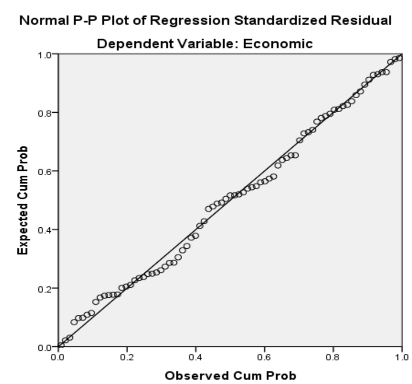



Figure 9.8.4.2: Normal P-P plot of regression standardised residual for regression between the SLM and the EO, mediating by IS

The relationship between economic and SLM as derived by the multiple regression analysis is shown by the following equation:

Yeslm = .471 + .104 SLM4 + .196 ISSN2 + .250 PSSN1 + .476 SSSN1 + .123 SLM11 - .177 SLM6

### 9.8.5. Regression between Government Council Level Measurements and Economic Outcomes, mediated by Innovation Skills:

Table 9.8.5.1 is the model summary that represents the regression between government council level measurements and economic outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 14 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (16 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 16 variables and ended up with only 3 considered variables which are: ISSN2, PSSN1, SSSN1. The selected model for this regression is model number 14; the last generated model. Remarkably, this model has not considered any components from the independent variable due to their insignificance in the relationship with the dependent variable. Statistically, this indicates that the success in economic initiatives is not really explained by the variables used in this study to measure the performance on government council level. The model summary table provides the overall persons correlation coefficient between the independent and dependent variables. In this case the multiple correlation is (.647) and the R Square value is (.418) and Adjusted R Square value is (.395). This means that there is a high degree of goodness of fit of the regression model between the selected mediator variables and dependent variable. In addition, R2 and adjusted R2 values indicate that over 39% of variance in the success of economic outcomes could be explained by having the skills of problem solving, leadership, augmentation.

Table 9.8.5.1: Model summary for regression between the GCLM and the EO, mediating by IS

**Model Summary[o]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .689[a] | .474 | .339 | .548 | .474 | 3.499 | 16 | 62 | .000 |
| 2 | .689[b] | .474 | .349 | .544 | .000 | .004 | 1 | 62 | .950 |
| 3 | .689[c] | .474 | .359 | .540 | .000 | .012 | 1 | 63 | .914 |
| 4 | .689[d] | .474 | .369 | .536 | .000 | .020 | 1 | 64 | .888 |
| 5 | .688[e] | .474 | .378 | .532 | .000 | .052 | 1 | 65 | .820 |
| 6 | .688[f] | .473 | .387 | .528 | -.001 | .065 | 1 | 66 | .800 |
| 7 | .688[g] | .473 | .396 | .524 | .000 | .027 | 1 | 67 | .870 |
| 8 | .687[h] | .472 | .403 | .521 | -.001 | .092 | 1 | 68 | .762 |
| 9 | .687[i] | .472 | .411 | .517 | -.001 | .095 | 1 | 69 | .759 |
| 10 | .686[j] | .471 | .419 | .514 | .000 | .044 | 1 | 70 | .835 |
| 11 | .681[k] | .464 | .419 | .514 | -.007 | .961 | 1 | 71 | .330 |
| 12 | .675[l] | .456 | .418 | .514 | -.008 | 1.135 | 1 | 72 | .290 |
| 13 | .662[m] | .439 | .409 | .519 | -.017 | 2.251 | 1 | 73 | .138 |
| 14 | .647[n] | .418 | .395 | .525 | -.021 | 2.735 | 1 | 74 | .102 |

n. Predictors: (Constant), ISSN2, PSSN1, SSSN1
o. Dependent Variable: Economic

Table 9.8.5.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (15.874) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in economic outcomes. Moreover, the Sum of Squares for this model is (13.774) and the residual value is (21.694), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (35.468). The degree of freedom for the model is (df = 3), while the mean squares is (4.591).

Table 9.8.5.2: ANOVA results for regression between the GCLM and the EO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 13.774 | 3 | 4.591 | 15.874 | .000[b] |
| | Residual | 21.694 | 75 | .289 | | |
| | Total | 35.468 | 78 | | | |

a. Dependent Variable: Economic

b. Predictors: (Constant), SSSN1, PSSN1, ISSN1

As this model has not considered any component from the independent variable (government council level measurements), there will not be further analysis of this regression model. In this study, the results of statistical analyses has not proved the relationship between performance of government council initiatives and the success of economic innovation outcomes.

## 9.9. Modelling the impact of performance level measurements factors on the success of public service innovation initiatives

This sections undergo the third cycle of regression analyses focusing on the impact of the performance of each identified level particularly on the success of economic innovation initiatives. The analyses of the relationships and the predictions will take into consideration the mediation effect of the skills required at each stage of the innovation process to diffuse innovation strategy in the public sector.

### 9.9.1. Regression between Project Level Measurements and Public Service Outcomes, mediated by Innovation Skills:

Table 9.9.1.1 is the model summary that represents the regression between project level measurements and public service outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 14 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (16 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 16 variables and ended up with only 3 variables which are: PSSN1, SSSN1, PLM4. The selected model for this regression is model number 14; the last generated model due to the application of backward method. The variation in public service innovation success can be explained by the model comprised of the 1 independent and 2 mediator variables. In this case the multiple correlation is (.550) and the R Square value is (.303) and Adjusted R Square value is (.275). This means that there is a moderate degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over

27% of variance in the success of public service outcomes could be explained by the performance of projects taking into account the skills of problem solving and augmentation.

Table 9.9.1.1: Model summary for regression between the PLM and the PSO, mediating by IS

**Model Summary[o]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .620[a] | .384 | .225 | .568 | .384 | 2.416 | 16 | 62 | .007 |
| 2 | .620[b] | .384 | .237 | .563 | .000 | .006 | 1 | 62 | .937 |
| 3 | .620[c] | .384 | .249 | .559 | .000 | .013 | 1 | 63 | .911 |
| 4 | .619[d] | .383 | .260 | .555 | .000 | .044 | 1 | 64 | .834 |
| 5 | .619[e] | .383 | .271 | .551 | .000 | .048 | 1 | 65 | .827 |
| 6 | .618[f] | .382 | .281 | .547 | -.001 | .099 | 1 | 66 | .755 |
| 7 | .617[g] | .381 | .290 | .544 | -.001 | .159 | 1 | 67 | .691 |
| 8 | .615[h] | .378 | .297 | .541 | -.002 | .270 | 1 | 68 | .605 |
| 9 | .611[i] | .374 | .302 | .539 | -.004 | .485 | 1 | 69 | .489 |
| 10 | .604[j] | .365 | .302 | .539 | -.009 | 1.018 | 1 | 70 | .316 |
| 11 | .594[k] | .353 | .299 | .540 | -.012 | 1.328 | 1 | 71 | .253 |
| 12 | .582[l] | .339 | .293 | .542 | -.014 | 1.565 | 1 | 72 | .215 |
| 13 | .571[m] | .326 | .290 | .544 | -.012 | 1.364 | 1 | 73 | .247 |
| 14 | .550[n] | .303 | .275 | .549 | -.024 | 2.588 | 1 | 74 | .112 |

n. Predictors: (Constant), PSSN1, SSSN1, PLM4

o. Dependent Variable: PublicService

Table 9.9.1.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (10.859) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in public service outcomes. Moreover, the Sum of Squares for this model is (9.827) and the residual value is (22.625), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (32.453). The degree of freedom for the model is ($df = 3$), while the mean squares is (3.276).

Table 9.9.1.2: ANOVA results for regression between the PLM and the PSO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 9.827 | 3 | 3.276 | 10.859 | .000[b] |
| | Residual | 22.625 | 75 | .302 | | |
| | Total | 32.453 | 78 | | | |

a. Dependent Variable: PublicService

b. Predictors: (Constant), SSSN1, PLM4, PSSN1

Table 9.9.1.3 presents the estimated coefficient values defining the contribution of each of the 3 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, SSSN1 “augmentation” has the highest positive impact than others (beta value = .347). It can be indicated that ISSN1 “Accountability” and PSSN1 “Problem Visualization and Solving” are significant predictors for the dependent variable as their Sig value below .05 (Sig. < .05). Noticeably, it is shown in the table that some variables contribute positively (i.e. SSSN1, PSSN1) to the public service outcomes, while others contribute negatively (i.e. PLM4) indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.9.1.3: Coefficient results for regression between the PLM and the PSO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients B | Unstandardized Coefficients Std. Error | Standardized Coefficients Beta | t | Sig. | 95.0% Confidence Interval for B Lower Bound | 95.0% Confidence Interval for B Upper Bound | Correlations Zero-order | Correlations Partial | Correlations Part | Collinearity Statistics Tolerance | Collinearity Statistics VIF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | (Constant) | 1.863 | .544 | | 3.425 | .001 | .780 | 2.947 | | | | | |
| | PLM4 | -.101 | .057 | -.175 | -1.781 | .079 | -.214 | .012 | -.102 | -.201 | -.172 | .966 | 1.035 |
| | PSSN1 | .309 | .131 | .274 | 2.349 | .021 | .047 | .570 | .430 | .262 | .226 | .686 | 1.459 |
| | SSSN1 | .408 | .135 | .347 | 3.020 | .003 | .139 | .677 | .483 | .329 | .291 | .705 | 1.418 |

a. Dependent Variable: PublicService

Table 9.9.1.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 1 condition index under 15, and 2 condition indices are in the usual rage of the threshold 15 to 30, and this model has no indices exceeding the threshold of 30. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.9.1.4: Collinearity diagnostics of the regression between the PLM and the PSO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions (Constant) | Variance Proportions PLM4 | Variance Proportions PSSN1 | Variance Proportions SSSN1 |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3.920 | 1.000 | .00 | .00 | .00 | .00 |
| | 2 | .063 | 7.885 | .01 | .96 | .02 | .02 |
| | 3 | .009 | 20.469 | .77 | .01 | .60 | .00 |
| | 4 | .008 | 22.438 | .22 | .03 | .38 | .97 |

a. Dependent Variable: PublicService

Table 9.9.1.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.9.1.5: Residuals statistics for regression between the PLM and the PSO, mediating by IS

**Residuals Statistics**[a]

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.61 | 5.34 | 4.45 | .355 | 79 |
| Residual | -1.659 | 1.094 | .000 | .539 | 79 |
| Std. Predicted Value | -2.374 | 2.517 | .000 | 1.000 | 79 |
| Std. Residual | -3.020 | 1.993 | .000 | .981 | 79 |

a. Dependent Variable: PublicService

Figure 9.9.1.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.9.1.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

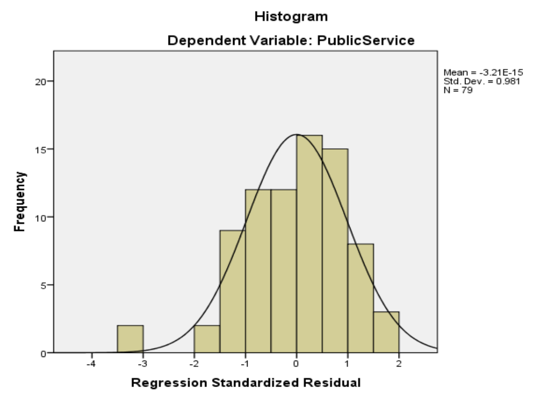



Figure 9.9.1.1: Histogram of the standardised residuals for regression between the PLM and the PSO, mediating by IS

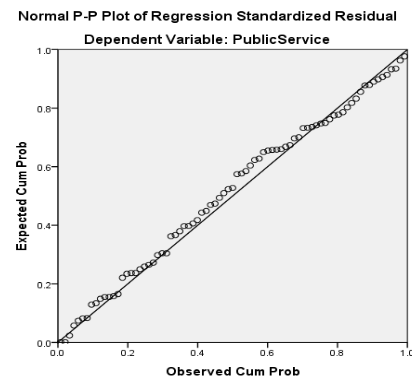



Figure 9.9.1.2: Normal P-P plot of regression standardised residual for regression between the PLM and the PSO, mediating by IS

The relationship between public service and PLM as derived by the multiple regression analysis is shown by the following equation:

Ypsplm = 1.863 - .101 PLM4 + .309 PSSN1 + .408 SSSN1

**9.9.2. Regression between Program Level Measurements and Public Service Outcomes, mediated by Innovation Skills:**

Table 9.9.2.1 is the model summary that represents the regression between program level measurements and public service outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 13 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (16 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 16 variables and ended up with only 4 variables which are: KSSN3, PrLM1, SSSN1, PrLM2. The selected model for this regression is model number 13; the last generated model due to the application of backward method. The variation in public service innovation success can be explained by the model comprised of the 2 independent and 2 mediator variables. In this case the multiple correlation is (.603) and the R Square value is (.364) and Adjusted R Square value is (.329). This means that there is a moderate degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over 32% of variance in the success of public service outcomes could be explained by the performance of program taking into account the skills of knowledge sharing and augmentation.

Table 9.9.2.1: Model summary for regression between the PrLM and the PSO, mediating by IS

**Model Summary[n]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .649[a] | .422 | .272 | .550 | .422 | 2.825 | 16 | 62 | .002 |
| 2 | .649[b] | .422 | .284 | .546 | .000 | .001 | 1 | 62 | .970 |
| 3 | .649[c] | .421 | .295 | .542 | .000 | .017 | 1 | 63 | .897 |
| 4 | .649[d] | .421 | .305 | .538 | .000 | .032 | 1 | 64 | .858 |
| 5 | .648[e] | .420 | .315 | .534 | -.001 | .085 | 1 | 65 | .771 |
| 6 | .647[f] | .419 | .324 | .530 | -.001 | .160 | 1 | 66 | .690 |
| 7 | .646[g] | .417 | .331 | .528 | -.002 | .257 | 1 | 67 | .614 |
| 8 | .644[h] | .415 | .339 | .525 | -.002 | .223 | 1 | 68 | .639 |
| 9 | .641[i] | .411 | .344 | .522 | -.003 | .409 | 1 | 69 | .525 |
| 10 | .634[j] | .403 | .344 | .523 | -.009 | 1.057 | 1 | 70 | .307 |
| 11 | .624[k] | .389 | .338 | .525 | -.013 | 1.564 | 1 | 71 | .215 |
| 12 | .617[l] | .380 | .338 | .525 | -.009 | 1.074 | 1 | 72 | .304 |
| 13 | .603[m] | .364 | .329 | .528 | -.017 | 1.948 | 1 | 73 | .167 |

m. Predictors: (Constant), KSSN3, PrLM1, SSSN1, PrLM2
n. Dependent Variable: PublicService

Table 9.9.2.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (10.576) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in public service outcomes. Moreover, the Sum of Squares for this model is (11.804) and the residual value is (20.649), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (32.453). The degree of freedom for the model is (df = 4), while the mean squares is (2.951).

Table 9.9.2.2: ANOVA results for regression between the PrLM and the PSO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 11.804 | 4 | 2.951 | 10.576 | .000[b] |
| | Residual | 20.649 | 74 | .279 | | |
| | Total | 32.453 | 78 | | | |

a. Dependent Variable: PublicService
b. Predictors: (Constant), SSSN1, PrLM1, KSSN3, PrLM2

Table 9.9.2.3 presents the estimated coefficient values defining the contribution of each of the 4 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, SSSN1 "augmentation" has the highest positive impact than others (beta value = .363). It can be indicated that all variables are significant predictors for the dependent variable as their Sig value below .05 (Sig. < .05). Noticeably, it is shown in the table that some variables contribute positively (i.e. PrLM2, KSSN3, SSSN1) to the public service outcomes, while only one variable contribute negatively (i.e. PrLM4) indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.9.2.3: Coefficient results for regression between the PrLM and the PSO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 1.359 | .575 | | 2.365 | .021 | .214 | 2.504 | | | | | |
| | PrLM1 | -.190 | .066 | -.339 | -2.879 | .005 | -.322 | -.059 | -.093 | -.317 | -.267 | .619 | 1.615 |
| | PrLM2 | .168 | .069 | .289 | 2.433 | .017 | .030 | .305 | .166 | .272 | .226 | .611 | 1.636 |
| | KSSN3 | .328 | .126 | .266 | 2.610 | .011 | .078 | .578 | .409 | .290 | .242 | .825 | 1.212 |
| | SSSN1 | .426 | .121 | .363 | 3.521 | .001 | .185 | .668 | .483 | .379 | .326 | .811 | 1.233 |

a. Dependent Variable: PublicService

Table 9.9.2.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 2 condition indices under 15, and 2 condition indices are in the usual rage of the threshold 15 to 30, and the model has no any indices exceeding the threshold of 30. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.9.2.4: Collinearity diagnostics of the regression between the PrLM and the PEO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | PrLM1 | PrLM2 | KSSN3 | SSSN1 |
| 1 | 1 | 4.843 | 1.000 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .101 | 6.925 | .01 | .22 | .17 | .02 | .02 |
| | 3 | .040 | 11.036 | .00 | .77 | .82 | .00 | .00 |
| | 4 | .009 | 22.638 | .09 | .01 | .01 | .35 | .95 |
| | 5 | .007 | 26.029 | .90 | .00 | .00 | .64 | .04 |

a. Dependent Variable: PublicService

Table 9.9.2.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.9.2.5: Residuals statistics for regression between the PrLM and the PEO, mediating by IS

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.42 | 5.18 | 4.45 | .389 | 79 |
| Residual | -1.452 | 1.165 | .000 | .515 | 79 |
| Std. Predicted Value | -2.660 | 1.884 | .000 | 1.000 | 79 |
| Std. Residual | -2.749 | 2.205 | .000 | .974 | 79 |

a. Dependent Variable: PublicService

Figure 9.9.2.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.9.2.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

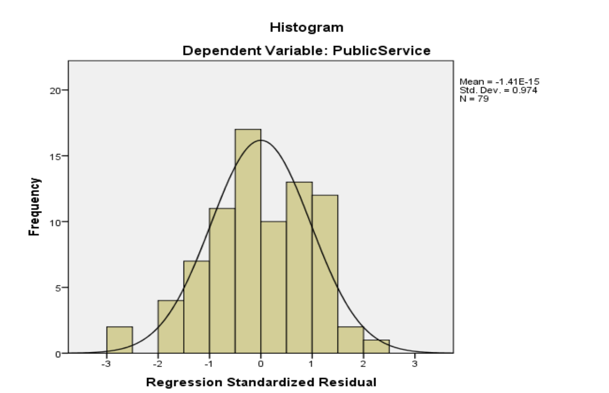



Figure 9.9.2.1: Histogram of the standardised residuals for regression between the PrLM and the PSO, mediating by IS

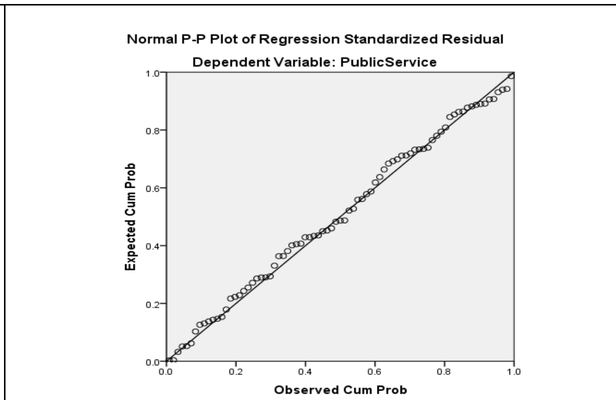



Figure 9.9.2.2: Normal P-P plot of regression standardised residual for regression between the PrLM and the PSO, mediating by IS

The relationship between public service and PrLM as derived by the multiple regression analysis is shown by the following equation:

Ypsprlm = 1.359 - .190 PrLM1 + .168 PrLM2 + .328 KSSN3 + .426 SSSN1

**9.9.3. Regression between Portfolio Level Measurements and Public Service Outcomes, mediated by Innovation Skills:**

Table 9.9.3.1 is the model summary that represents the regression between portfolio level measurements and public service outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 9 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (17 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 17 variables and ended up with only 9 variables which are: PoLM6, PoLM1, ISSN2, SSSN2, KSSN2, KSSN1, SSSN1, PoLM5, PoLM3. The selected model for this regression is model number 9; the last generated model due to the application of backward method. The variation in public service innovation success can be explained by the model comprised of the 4 independent and 5 mediator variables. In this case the multiple correlation is (.786) and the R Square value is (.617) and Adjusted R Square value is (.567). This means that there is a moderate degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over 56% of variance in the success of public service outcomes could be explained by the performance of portfolio taking into account the skills of leadership, management support, risk-taking, ideas creation, knowledge sharing, and augmentation.

Table 9.9.3.1: Model summary for regression between the PoLM and the PSO, mediating by IS

**Model Summary[j]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .811[a] | .658 | .563 | .427 | .658 | 6.904 | 17 | 61 | .000 |
| 2 | .810[b] | .656 | .567 | .424 | -.002 | .384 | 1 | 61 | .538 |
| 3 | .808[c] | .653 | .571 | .423 | -.003 | .469 | 1 | 62 | .496 |
| 4 | .807[d] | .651 | .575 | .421 | -.002 | .388 | 1 | 63 | .536 |
| 5 | .806[e] | .649 | .579 | .418 | -.002 | .332 | 1 | 64 | .567 |
| 6 | .802[f] | .643 | .578 | .419 | -.006 | 1.184 | 1 | 65 | .281 |
| 7 | .798[g] | .636 | .577 | .420 | -.006 | 1.194 | 1 | 66 | .278 |
| 8 | .791[h] | .626 | .571 | .422 | -.010 | 1.881 | 1 | 67 | .175 |
| 9 | .786[i] | .617 | .567 | .424 | -.009 | 1.673 | 1 | 68 | .200 |

i. Predictors: (Constant), PoLM6, PoLM1, ISSN2, SSSN2, KSSN2, KSSN1, SSSN1, PoLM5, PoLM3
j. Dependent Variable: PublicService

Table 9.9.3.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (12.354) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in economic outcomes. Moreover, the Sum of Squares for this model is (20.025) and the residual value is (12.427), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (32.453). The degree of freedom for the model is (df = 9), while the mean squares is (2.225).

Table 9.9.3.2: ANOVA results for regression between the PoLM and the PSO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 20.025 | 9 | 2.225 | 12.354 | .000[b] |
| | Residual | 12.427 | 69 | .180 | | |
| | Total | 32.453 | 78 | | | |

a. Dependent Variable: PublicService

b. Predictors: (Constant), SSSN1, PoLM3, ISSN2, KSSN2, KSSN1, PoLM5, SSSN2, PoLM6, PoLM1

Table 9.9.3.3 presents the estimated coefficient values defining the contribution of each of the 9 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, PoLM1 "Ideas in portfolio are evaluated to ensure the balance of projects in terms of their timing, technical complexity, expected market impact and risk level" has the highest positive impact than others (beta value = .430), while PoLM5 "Indicators to assess innovation results are defined" has the highest negative impact than others. It can be indicated that all variables are significant predictors for the dependent variable as their Sig value below .05 (Sig. < .05), except ISSN2 which is nearly significant at Sig value of (.096). Noticeably, it is shown in the table that some variables contribute positively (i.e. PoLM6, PoLM1, ISSN2, SSSN2, KSSN2, KSSN1) to the public service outcomes, while other variable contribute negatively (i.e. PoLM5, PoLM3, PoLM6, SSSN1) indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model; (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.9.3.3: Coefficient results for regression between the PoLM and the PSO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 1.479 | .485 | | 3.051 | .003 | .512 | 2.446 | | | | | |
| | PoLM6 | .140 | .065 | .241 | 2.173 | .033 | .011 | .269 | -.146 | .253 | .162 | .452 | 2.215 |
| | PoLM1 | .248 | .065 | .430 | 3.817 | .000 | .118 | .377 | -.040 | .418 | .284 | .437 | 2.287 |
| | PoLM5 | -.415 | .069 | -.695 | -6.049 | .000 | -.551 | -.278 | -.349 | -.589 | -.451 | .420 | 2.382 |
| | PoLM3 | -.219 | .067 | -.405 | -3.288 | .002 | -.351 | -.086 | -.255 | -.368 | -.245 | .366 | 2.730 |
| | ISSN2 | .126 | .075 | .144 | 1.689 | .096 | -.023 | .275 | .342 | .199 | .126 | .760 | 1.315 |
| | SSSN2 | -.355 | .107 | -.339 | -3.329 | .001 | -.568 | -.142 | .257 | -.372 | -.248 | .534 | 1.874 |
| | KSSN2 | .388 | .111 | .338 | 3.479 | .001 | .165 | .610 | .253 | .386 | .259 | .588 | 1.701 |
| | KSSN1 | .243 | .096 | .223 | 2.541 | .013 | .052 | .434 | .346 | .293 | .189 | .720 | 1.389 |
| | SSSN1 | .484 | .114 | .412 | 4.242 | .000 | .257 | .712 | .483 | .455 | .316 | .589 | 1.698 |

a. Dependent Variable: PublicService

Table 9.9.3.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 2 condition indices under 15, and 4 condition indices are in the usual rage of the threshold 15 to 30, and 3 indices exceeding the threshold of 30, and this accounted for dimension 8, 9, 10 at (31.902, 34.331, 37.598 respectively). Those dimensions has not indicated a high linear dependence as they did not reach to at least two variables in the variance proportion with .50 value or higher with a high condition index. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.9.3.4: Collinearity diagnostics of the regression between the PoLM and the PSO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | PoLM6 | PoLM1 | PoLM5 | PoLM3 | ISSN2 | SSSN2 | KSSN2 | KSSN1 | SSSN1 |
| 1 | 1 | 9.623 | 1.000 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .192 | 7.082 | .00 | .03 | .03 | .03 | .05 | .02 | .01 | .00 | .00 | .00 |
| | 3 | .058 | 12.864 | .00 | .28 | .37 | .07 | .03 | .01 | .00 | .00 | .00 | .00 |
| | 4 | .039 | 15.678 | .00 | .02 | .11 | .43 | .48 | .01 | .00 | .01 | .00 | .00 |
| | 5 | .031 | 17.616 | .00 | .52 | .22 | .33 | .19 | .01 | .02 | .01 | .00 | .00 |
| | 6 | .020 | 22.014 | .01 | .08 | .01 | .01 | .01 | .93 | .03 | .02 | .01 | .04 |
| | 7 | .013 | 27.234 | .04 | .04 | .00 | .03 | .04 | .01 | .31 | .02 | .57 | .00 |
| | 8 | .009 | 31.902 | .36 | .01 | .08 | .04 | .08 | .00 | .22 | .25 | .27 | .03 |
| | 9 | .008 | 34.311 | .09 | .00 | .11 | .00 | .09 | .01 | .10 | .31 | .15 | .61 |
| | 10 | .007 | 37.598 | .50 | .02 | .07 | .06 | .03 | .02 | .32 | .37 | .00 | .30 |

a. Dependent Variable: PublicService

Table 9.9.3.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.9.3.5: Residuals statistics for regression between the PoLM and the PSO, mediating by IS

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 2.56 | 5.31 | 4.45 | .507 | 79 |
| Residual | -.956 | 1.115 | .000 | .399 | 79 |
| Std. Predicted Value | -3.730 | 1.697 | .000 | 1.000 | 79 |
| Std. Residual | -2.253 | 2.628 | .000 | .941 | 79 |

a. Dependent Variable: PublicService

Figure 9.9.3.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.9.3.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

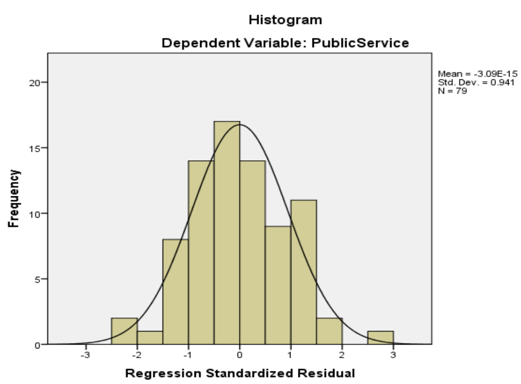



Figure 9.9.3.1: Histogram of the standardised residuals for regression between the PoLM and the PSO, mediating by IS

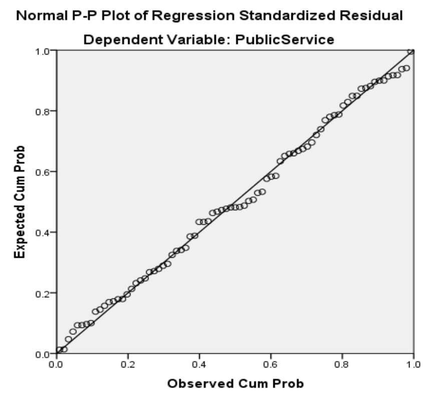



Figure 9.9.3.2: Normal P-P plot of regression standardised residual for regression between the PoLM and the PSO, mediating by IS

The relationship between public service and PoLM as derived by the multiple regression analysis is shown by the following equation:

Ypspolm = 1.479 + .140 PoLM6 + .248 PoLM1 - .415 PoLM5 - .219 PoLM3 + .126 ISSN2 - .355 SSSN2 + .388 KSSN2 + .243 KSSN1 + .484 SSSN1

**9.9.4. Regression between Strategy Level Measurements and Public Service Outcomes, mediated by Innovation Skills:**

Table 9.9.4.1 is the model summary that represents the regression between strategy level measurements and public service outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 19 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (23 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 23 variables and ended up with only 5 variables which are: PSSN1, SSSN1, SLM3, SLM6, SLM5. The selected model for this regression is model number 19; the last generated model due to the application of backward method. The variation in public service innovation success can be explained by the model comprised of the 3 independent and 2 mediator variables. In this case the multiple correlation is (.619 and the R Square value is (.383) and Adjusted R Square value is (.341). This means that there is a moderate degree of goodness of fit of the regression model. In addition, R2 and adjusted R2 values indicate that over 34% of variance in the success of public service outcomes could be explained by the performance of organisational strategy taking into account the skills of problem solving and augmentation.

Table 9.9.4.1: Model summary for regression between the SLM and the PSO, mediating by IS

**Model Summary[t]**

| | | | | | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .721[a] | .520 | .320 | .532 | .520 | 2.592 | 23 | 55 | .002 |
| 2 | .721[b] | .520 | .332 | .527 | .000 | .005 | 1 | 55 | .944 |
| 3 | .721[c] | .520 | .343 | .523 | .000 | .014 | 1 | 56 | .906 |
| 4 | .721[d] | .520 | .354 | .518 | .000 | .019 | 1 | 57 | .891 |
| 5 | .721[e] | .519 | .365 | .514 | .000 | .058 | 1 | 58 | .810 |
| 6 | .720[f] | .519 | .374 | .510 | -.001 | .081 | 1 | 59 | .777 |
| 7 | .720[g] | .518 | .384 | .506 | -.001 | .091 | 1 | 60 | .764 |
| 8 | .719[h] | .517 | .392 | .503 | -.001 | .128 | 1 | 61 | .722 |
| 9 | .718[i] | .515 | .400 | .500 | -.002 | .209 | 1 | 62 | .649 |
| 10 | .716[j] | .512 | .406 | .497 | -.003 | .374 | 1 | 63 | .543 |
| 11 | .710[k] | .504 | .405 | .498 | -.009 | 1.129 | 1 | 64 | .292 |
| 12 | .701[l] | .491 | .398 | .500 | -.013 | 1.683 | 1 | 65 | .199 |
| 13 | .692[m] | .480 | .394 | .502 | -.011 | 1.489 | 1 | 66 | .227 |
| 14 | .682[n] | .466 | .387 | .505 | -.014 | 1.775 | 1 | 67 | .187 |
| 15 | .670[o] | .449 | .377 | .509 | -.017 | 2.121 | 1 | 68 | .150 |
| 16 | .664[p] | .440 | .376 | .509 | -.009 | 1.080 | 1 | 69 | .302 |
| 17 | .651[q] | .424 | .368 | .513 | -.016 | 2.005 | 1 | 70 | .161 |
| 18 | .635[r] | .403 | .353 | .519 | -.021 | 2.648 | 1 | 71 | .108 |
| 19 | .619[s] | .383 | .341 | .524 | -.020 | 2.425 | 1 | 72 | .124 |

s. Predictors: (Constant), PSSN1, SSSN1, SLM3, SLM6, SLM5
t. Dependent Variable: PublicService

Table 9.9.4.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (9.057) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in public service outcomes. Moreover, the Sum of Squares for this model is (12.424) and the residual value is (20.029), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (32.453). The degree of freedom for the model is ($df = 5$), while the mean squares is (2.485).

Table 9.9.4.2: ANOVA results for regression between the SLM and the PSO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 12.424 | 5 | 2.485 | 9.057 | .000[b] |
| | Residual | 20.029 | 73 | .274 | | |
| | Total | 32.453 | 78 | | | |

a. Dependent Variable: PublicService

b. Predictors: (Constant), SSSN1, SLM3, SLM6, PSSN1, SLM5

Table 9.9.4.3 presents the estimated coefficient values defining the contribution of each of the 5 variables towards the dependent variable. By comparing the standardized coefficient of all concluded variables in the model, SLM5 “Top management have a clear innovation vision and strategy” has the highest positive impact than others (beta value = .398). It can be indicated that all variables are highly significant predictors for the dependent variable as their Sig value shown below .05 (Sig. < .05). Noticeably, it is shown in the table that almost all variables contribute positively to the public service outcomes, while only SLM3 and SLM6 contribute negatively, indicating a negative impact on the dependent variable. The information in the same table also allows for checking multicollinearity in the multiple linear regression model in which the (Tolerance > 0.1) or (VIF < 10) for all variables. As none of the tolerance values smaller than 0.10, there is no evidence of multicollinearity from the data presented in the tolerance values.

Table 9.9.4.3: Coefficient results for regression between the SLM and the PSO, mediating by IS

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 1.992 | .521 | | 3.826 | .000 | .954 | 3.029 | | | | | |
| | SLM3 | -.189 | .073 | -.304 | -2.587 | .012 | -.335 | -.043 | -.150 | -.290 | -.238 | .612 | 1.634 |
| | SLM5 | .195 | .075 | .398 | 2.605 | .011 | .046 | .344 | .107 | .292 | .240 | .362 | 2.762 |
| | SLM6 | -.170 | .082 | -.304 | -2.073 | .042 | -.334 | -.007 | -.011 | -.236 | -.191 | .392 | 2.549 |
| | PSSN1 | .422 | .131 | .374 | 3.228 | .002 | .161 | .682 | .430 | .353 | .297 | .631 | 1.584 |
| | SSSN1 | .318 | .135 | .270 | 2.354 | .021 | .049 | .587 | .483 | .266 | .216 | .641 | 1.561 |

a. Dependent Variable: PublicService

Table 9.9.4.4 presents the collinearity diagnostics of the regression analyses. As the eigenvalues are close to 0 for several variables, indicating that the predictors are highly intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients. Whereas, the condition indices are computed resulting 3 condition indices under 15, and 2 condition indices are in the usual rage of the threshold 15 to 30, and the model has no any indices exceeding the threshold of 30. Therefore, the data suggest that there is no serious problem with multicollinearity in the model.

Table 9.9.4.4: Collinearity diagnostics of the regression between the SLM and the PSO, mediating by IS

**Collinearity Diagnostics[a]**

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | SLM3 | SLM5 | SLM6 | PSSN1 | SSSN1 |
| 1 | 1 | 5.795 | 1.000 | .00 | .00 | .00 | .00 | .00 | .00 |
| | 2 | .117 | 7.032 | .02 | .01 | .15 | .05 | .02 | .01 |
| | 3 | .045 | 11.371 | .00 | .87 | .08 | .07 | .00 | .01 |
| | 4 | .027 | 14.779 | .00 | .00 | .64 | .83 | .00 | .01 |
| | 5 | .009 | 25.111 | .82 | .01 | .01 | .03 | .48 | .03 |
| | 6 | .007 | 29.071 | .16 | .11 | .12 | .02 | .50 | .94 |

a. Dependent Variable: PublicService

Table 9.9.4.5 provides residuals statistics for the regression analyses. This table mainly reports descriptive statistics for the predicted and residual values, in addition to testing the linearity between dependent and independent variables for the generated regression model. In general, data residuals should not be disrupted in terms of homoscedasticity, independence, and normality. As illustrated, the mean of the residuals is equal to zero which proves no disruptions of the errors.

Table 9.9.4.5: Residuals statistics for regression between the SLM and the PSO, mediating by IS

**Residuals Statistics**[a]

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.36 | 5.37 | 4.45 | .399 | 79 |
| Residual | -1.601 | 1.246 | .000 | .507 | 79 |
| Std. Predicted Value | -2.745 | 2.314 | .000 | 1.000 | 79 |
| Std. Residual | -3.056 | 2.378 | .000 | .967 | 79 |

a. Dependent Variable: PublicService

Figure 9.9.4.1 is the plotted histogram of the standardised residuals for the generated model. The overall pattern of the residuals is similar to the bell-shaped pattern. This means that the frequency of the standardised residuals is almost follows a normal curve. This also suggests that the normality of the dependent variable is not disrupted.

Figure 9.9.4.2 examines the normal P-P plot of regression standardised residual for the generated model. The plot shows that the points generally follow the normal (diagonal) straight line with no strong deviations. Overall, this indicates that the residuals are normally distributed and there does not appear to be a severe problem with non-normality of residuals.

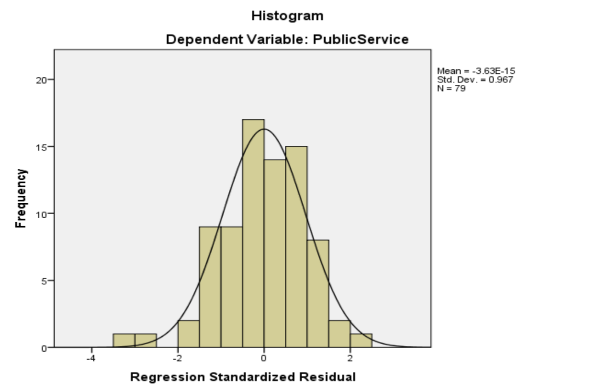



Figure 9.9.4.1: Histogram of the standardised residuals for regression between the SLM and the PSO, mediating by IS

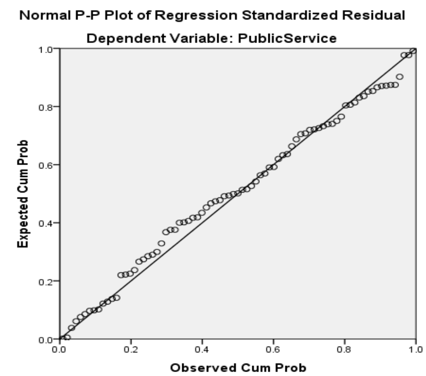



Figure 9.9.8.2: Normal P-P plot of regression standardised residual for regression between the SLM and the PSO, mediating by IS

The relationship between public service and SLM as derived by the multiple regression analysis is shown by the following equation:

Ypsslm = 1.992 - .189 SLM3 + .195 SLM5 - .170 SLM6 + .422 PSSN1 + .318 SSSN1

### 9.9.5. Regression between Government Council Level Measurements and Public Service Outcomes, mediated by Innovation Skills:

Table 9.9.5.1 is the model summary that represents the regression between government council level measurements and public service outcomes, whereas the innovation skills are the mediator in this equation. The table indicates that there are 15 models explaining the relationships between dependent, independent, and mediator variables. As mentioned the selected method is set as backward, thus the statistics of those models will begin the calculation considering all entered variables (16 variables), and then it starts exclude the lower correlated variables one at a time till no significant improvement arises. The model started with 16 variables and ended up with only 2 considered variables which are: KSSN3, SSSN1. The selected model for this regression is model number 15; the last generated model. Remarkably, this model has not considered any components from the independent variable due to their insignificance in the relationship with the dependent variable. Statistically, this indicates that the success in public service initiatives is not really explained by the variables used in this study to measure the performance on government council level. The model summary table provides the overall persons correlation coefficient between the independent and dependent variables. In this case the multiple correlation is (.535) and the R Square value is (.286) and Adjusted R Square value is (.267). This means that there is a high degree of goodness of fit of the regression model between the selected mediator variables and dependent variable. In addition, R2 and adjusted R2 values indicate that over 26% of variance in the success of public service outcomes could be explained by having the skills of knowledge sharing and augmentation.

Table 9.9.5.1: Model summary for regression between the GCLM and the PSO, mediating by IS

**Model Summary[p]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .617[a] | .381 | .221 | .569 | .381 | 2.384 | 16 | 62 | .008 |
| 2 | .617[b] | .381 | .233 | .565 | .000 | .001 | 1 | 62 | .974 |
| 3 | .617[c] | .380 | .245 | .561 | .000 | .041 | 1 | 63 | .841 |
| 4 | .616[d] | .380 | .256 | .556 | -.001 | .064 | 1 | 64 | .801 |
| 5 | .615[e] | .379 | .266 | .553 | -.001 | .135 | 1 | 65 | .715 |
| 6 | .613[f] | .376 | .273 | .550 | -.003 | .294 | 1 | 66 | .589 |
| 7 | .609[g] | .371 | .279 | .548 | -.004 | .479 | 1 | 67 | .491 |
| 8 | .603[h] | .363 | .280 | .547 | -.008 | .861 | 1 | 68 | .357 |
| 9 | .601[i] | .361 | .288 | .544 | -.003 | .295 | 1 | 69 | .589 |
| 10 | .595[j] | .353 | .290 | .544 | -.007 | .781 | 1 | 70 | .380 |
| 11 | .590[k] | .348 | .294 | .542 | -.006 | .615 | 1 | 71 | .436 |
| 12 | .579[l] | .335 | .290 | .544 | -.013 | 1.382 | 1 | 72 | .244 |
| 13 | .569[m] | .324 | .288 | .544 | -.011 | 1.225 | 1 | 73 | .272 |
| 14 | .552[n] | .305 | .277 | .549 | -.020 | 2.148 | 1 | 74 | .147 |
| 15 | .535[o] | .286 | .267 | .552 | -.018 | 1.991 | 1 | 75 | .162 |

o. Predictors: (Constant), KSSN3, SSSN1

p. Dependent Variable: PublicService

Table 9.9.5.2 is the result of ANOVA test, looking at F-Ratio for the selected model which is (15.231) and it is significant at ($p < .001$) indicating that the regression model predicts the dependent variable well. As the generated F-Ratio is highly significant, by this it can be assumed that the model explains a significant amount of the variance in public service outcomes. Moreover, the Sum of Squares for this model is (9.286) and the residual value is (23.167), therefore, the amount of variation in the data that can't be accounted for by this simple method of prediction is (32.453). The degree of freedom for the model is ($df = 2$), while the mean squares is (4.643).

Table 9.9.5.2: ANOVA results for regression between the GCLM and the PSO, mediating by IS

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 9.286 | 2 | 4.643 | 15.231 | .000[b] |
| | Residual | 23.167 | 76 | .305 | | |
| | Total | 32.453 | 78 | | | |

a. Dependent Variable: PublicService

b. Predictors: (Constant), SSSN1, KSSN3

As this model has not considered any component from the independent variable (government council level measurements), there will not be further analysis of this regression model. In this study, the results of statistical analyses has not proved the relationship between performance of government council initiatives and the success of public service innovation outcomes.