The effect of stakeholder integration on open innovation in construction projects

تأثير دمج أصحاب المصالح و الحقوق على الإبتكار المفتوح في مشاريع البناء

by

SHAIMA ALHARMOODI, MUP

A thesis submitted in fulfilment

of the requirements for the degree of

PhD IN PROJECT MANAGEMENT

at

The British University in Dubai

Professor Ashly H. Pinnington
April 2017

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Thesis Supervisor

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Abstract

This thesis investigates the effect of stakeholder integration on innovation effectiveness in an open innovation context in sustainable construction projects. It delivers an original contribution to knowledge by developing an empirically validated conceptual model that consists of the main factors that have an influence, and are influenced by, stakeholder integration. These factors, namely leadership for innovation and team identity, were identified and synthesized through a comprehensive review of the existing literature. This specific research intent arose from the noticeable lack of empirical studies relating these aspects and the continuous pressure on the construction sector to keep up with the competitiveness in the market as nations have raised their awareness of sustainable development, globally. The multidisciplinary and multi-party nature of construction projects, especially larger projects, necessitates a well-established framework to integrate the complex network of stakeholders for delivering successful innovation in their projects. To facilitate the analysis of the conceptual model, the research adopts a constructivist qualitative approach and analyses data obtained from three case studies through 38 semi-structured interviews. To ensure the validity, triangulation of three methods of data collection was obtained and rich and thick description of the three cases was provided. The validated conceptual model concludes that stakeholder integration in innovation projects is highly induced by leadership and that these two aspects influence the identity of the team and their perception about the innovation, which consequently affect the effectiveness of the innovation. These factors are in turn influenced by the extent of personal interest in the innovation. The findings of this research provide critical understanding of how stakeholder integration can lead to better management of innovation in general and the conceptual framework can assist construction firms and projects with diagnosing the contextual conditions of their innovation practices. It also can guide firms on their innovation strategies and ultimately increase their effectiveness by identifying the factors that enhance leadership for innovation, stakeholder integration, team identity, and consequently achieve an effective innovation.

Abstract in Arabic

نبذة مختصرة

تبحث هذه الأطروحة تأثير دمج أصحاب المصالح و الحقوق على فعالية الإبتكار المفتوح في مشاريع البناء المستدامة. كما أنها تقدم مساهمة أصلية للمعرفة من خلال إبتكار نموذج مفاهيمي، تم اختبار مدى صحته تجريبيًا، يتكون من العوامل الرئيسية التي تحظى بتأثير على اندماج أصحاب المصالح و الحقوق وتتأثر به. وقد تم تحديد هذه العوامل، وهي على وجه الخصوص قيادة الإبتكار وهوية الفريق، وكذا تجميعها من خلال استعراض شامل للأدبيات الموجودة. وقد نشأ مقصد هذا البحث المحدد نتيجة للنقص الملحوظ في الدراسات التجريبية المتعلقة بهذه الجوانب فضلاً عن الضغط المتواصل على قطاع البناء لمواكبة القدرة التنافسية في السوق حيث زادت الدول من وعيها بالتنمية المستدامة على الصعيد العالمي. وتتطلب طبيعة مشاريع البناء المتسمة بتعدد التخصصات والأطراف، ولاسيما المشاريع الأكبر حجمًا، إطارًا راسخًا لدمج الشبكة المعقدة المكونة من أصحاب المصالح و الحقوق من أجل تحقيق ابتكار ناجح عبر مشاريعهم. ولذا يعتمد البحث نهجًا نوعيًا بنّاًء ويحلل البيانات التي تم الحصول عليها من ثلاث دراسات حالة تم استقاؤها عبر 38 مقابلة شخصية شبه منظمة، وذلك لتسهيل عملية تحليل النموذج المفاهيمي. ولقد تم الحصول على مخطط ذي ثلاث طرق لجمع البيانات كما تم تقديم وصف ثري وعميق للحالات الثلاثة، وذلك سعيًا إلى ضمان صحة البيانات. حيث يخلُص النموذج المفاهيمي الذي تم التحقق من صحته إلى إدماج أصحاب المصالح في مشاريع الإبتكار

تحفزه القيادة إلى حد كبير وأن هذين الجانبين يؤثران على هوية الفريق ومدى إدراكهم لمغزى الإبتكار مما يؤثر بالتالي على فعاليته. وتتأثر هذه العوامل بدورها بمدى الاهتمام الشخصي الذي يتم إيلاؤه للإبتكار. وتقدم النتائج المستخلصة من هذا البحث رؤى حول كيف يمكن للإندماج بين أصحاب المصالح و الحقوق أن يؤدي إلى إدارة أفضل للإبتكار بشكل عام، وكذا كيف يمكن للإطار المفاهيمي مساعدة شركات البناء وكذا المشاريع من خلال تشخيصه ووصفه للظروف السياقية لممارساتهم للإبتكار. كما يمكن أن يوجه الشركات إلى استراتيجيات الإبتكار الخاصة بها، وأن يزيد من فعاليتها في نهاية المطاف.

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My dearest father and mother, this achievement is dedicated to you.

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List of Abbreviations

BIM	Building Information Modelling
CAD	Computer Assisted Design
CEO	Chief executive officer
CFO	Chief financial officer
CL	Change-oriented leadership
COO	Chief operation officer
CRM	Customer relation manager
DEWA	Dubai Electricity and Water Authority
DM	Dubai Municipality
EVP	Executive vice president
GBC	Green Building Certification
IC	Innovation champion
IE	Innovation effectiveness
II	Interest in innovation
LEED	Leadership in Energy and Environmental Design
LI	Leadership for innovation
LMX	Leader-member exchange
RTA	Roads and Transport Authority
SI	Stakeholder integration
SVP	Senior vice president
TI	Team identity
TL	Transformational leadership
UAE	United Arab Emirates
VP	Vice president

List of Publications

AlHarmoodi, S. (2014). Smart, sustainable, and healthy cities. *Stakeholder integration and innovation effectiveness: a review of the literature: The 1st International Conference of the CIB-MENA Research Network*. Abu Dhabi University. Abu Dhabi. 14-16 December.

AlHarmoodi, S. (2015). Stakeholder integration in open innovation construction projects: BUiD 1st Doctoral Research Conference. The British University in Dubai. Dubai. 16 May.

AlHarmoodi, S & Dulaimi, M. (2016). Advancing products and services. *Stakeholder integration and innovation effectiveness in sustainable construction projects*: CIB World Building Congress. Tampere University of Technology. Tampere. TUT:

Chapter 1- Introduction to the research

Introduction to Chapter

This introductory chapter explains the purpose and motivation for this research supported by some background information that led to the initial identification of the research problem. The chapter further introduces the aim and research objectives and accordingly, the value of this research. The final section of this chapter provides an overview of this research and the structure of the thesis.

1.1 Research problem and rationale

A global shift towards innovation has been witnessed over the last few decades as nations have realized its importance as a major driver for economic growth and its essential role in strengthening nations' competitiveness. Added to that some global issues such as the rapid increase in human population, the finite nature of fossil resources, climate change, global warming, biodiversity degradation, and the 2008 global financial crisis have all contributed to calls for action by nations to move towards innovation to produce sustainable products, processes and services (Toole at al. 2013; Yigitcanlar & Suharto 2015; Herazo & Lizarralde 2015).

The construction sector is under massive pressure to develop new practices and improve existing ones to have a less threatening impact on the environment and at the same time achieve social and economic sustainability. Whereas the rate of change in the construction industry has been slow and the sector is considered relatively stable, innovation has become a more vital source of competitive advantage and a major incentive for construction organisations to accommodate changes in their complex products and processes (Eaton et al. 2006; Aouad et al. 2010; Ozorhon 2013).

Many studies have investigated the different ways of implementing innovation in construction mainly concentrating on how innovation is managed within one firm, but there is a lack of research on project stages. Moreover, only a few of these studies have discussed the proper indicators for construction innovation (Ozorhon 2013; Ozorhon et al. 2010; Murphy et al. 2011; Blayse and Manley 2004). Hence, this research examines how the traditional process of a construction project achieved by a design-tender-build approach is reformed in line with the innovation goal. It looks at how the traditional way of constituting the construction project, where the owner contracts with a design organisation to perform preliminary planning, carries out design work, prepares contract documents and then selects a construction organisation based upon the owner's criteria, can affect the innovation outcome.

In complex systems such as the construction industry, projects have to use the capabilities of different stakeholders to produce innovations and this is facilitated by the cooperation, communication and integration between those concerned with the development of products and designs. According to Kumaraswamy and Dulaimi (2001) procurement systems that favour speed, urgency and financial benefit such as the traditional lump-sum contract tend to discourage the adoption of non-traditional processes and products and are most detrimental to innovation. They involve the highest cost risk for contractors, the highest occurrence of adversarial relationships, the lowest level of integration among stakeholders, and the poorest innovation outcomes.

Higher levels of innovation arise when a suitable procurement method is chosen. From an innovation standpoint, it is crucial to have a well-integrated team since this aspect is key in driving innovation (Walker et al. 2003; CIOB 2010; ICE 2015). This can involve partnering beside fixed cost contracts to advance communication, learning, and innovation outcomes on straightforward projects. For more complex projects, a design-build, construction management, project management, or BOOT style arrangement can have good innovation outcomes since these approaches integrate the design and construction functions resulting in enhanced design constructability and economic performance, through innovation (Walker et al. 2003; Kumaraswamy & Dulaimi 2001).

This indicates that to achieve a good innovation outcome, a high level of coordination and integration amongst a large number of internal and external stakeholders is required to enable the conception and implementation of effective innovation on projects. Hence, the idea of open innovation has been widely recognized by different sectors as it promotes cross-boundary collaboration and knowledge sharing between the different stakeholders to achieve innovation goals (Chesbrough 2003). This becomes all the more vital when dealing with sustainability, which adds a new priority and more stakeholders that have diverse interests. A well-managed stakeholder integration process helps different stakeholders work together to increase comfort and quality of life by achieving sustainable innovations that decrease negative environmental impacts.

Previous studies have focused on different aspects that influence innovation implementation capability in firms. These have been driven mostly from within the social science school of thought, such as organizational climate and culture (Rogers 2003; Patanakul & Aronson 2012), the characteristics of top management teams (West & Anderson 1996), and entrepreneurship (Xu 2007). These studies typically focus on how innovation is managed within a firm and there is a lack of focus on the project level. Many of the project level studies tend to address innovation at the project level in general with only few articles analysing innovation at a specific stage of the project lifecycle (Dickinson et al. 2005; Bahemia & Squire 2010; Tranekjer & Sondergaard, 2013; Ozorhon et al. 2010). Further, there is an evident lack of research on the influence of stakeholders on the effectiveness of open innovation in the construction field. Being a multidisciplinary and multi-party industry, it is therefore very important to understand the dynamics of multiple stakeholders on projects.

For effective open innovation to occur, it is necessary that innovation is communicated through a complex social system and interactions overtime (Rogers 2003). Researchers such as Rogers (2003), Hall & Vredenburg (2003), Hart & Sharma (2004), and Buchel et al. (2013) have highlighted the roles of stakeholders in innovation and argued that this issue is a major influence. Integration for innovation is also highly related to leadership (Ozorhon et al. 2014; Aronson et al. 2013; Yukl 2010). Research has presented evidence that leadership style has a significant influence on innovation. The different characteristics and behaviours of leaders play a major role in facilitating or hindering the integration of stakeholders (Howell & Shea 2001; Ozorhon 2013). Their influence on the team and their ability to facilitate the development of an identity among the innovation team members has been discussed in some studies (Rese & Baier 2012). However, the link between role of leaders in facilitating the effective stakeholders' integration and an innovation team identity in an open innovation context and its influence on the innovation effectiveness is currently lacking in the research literature, especially in the context of construction projects. This link becomes more important in the context of sustainability due to the significant role that stakeholders play in setting the sustainability agenda.

1.2 Research aim and objectives

This thesis aims to study the effect that stakeholder integration has on innovation effectiveness in an open innovation project context to deliver environmentally sustainable construction facilities. This specific research intent arises from the noticeable lack of empirical studies relating these aspects. Bearing in mind the knowledge gaps and research demands identified above, the primary objective of this thesis is to review the existing literature to understand the relationship between open innovation, stakeholder integration, leadership for innovation and its influence on the innovation team, and consequently, its effect on innovation effectiveness.

This overall aim is intended to be achieved through investigation of the following research objectives:

1. Examine the integration of stakeholders throughout the construction project lifecycle and the open innovation process
2. Identify leadership characteristics that enhance the integration of stakeholders and creates an identity among team members throughout the project lifecycle in an open innovation context

3. Examine the relationship between stakeholder integration and team identity in an open innovation context in construction projects
4. Identify innovation team characteristics that facilitate the achievement of effective innovations.
5. Investigate the relationship between the innovation leader, stakeholder integration, and team identity and their effect on the innovation
6. Develop an empirically-tested model that encapsulates the above identified constructs and the uncovered relationships, which can then be used to depict the mechanisms of enhancing innovation effectiveness in construction projects.

1.3 Research questions

On the basis of the research problem, aim and objectives, this research sought to answer the following questions:

RQ1: What is the effect of leadership for innovation on stakeholder integration in an open innovation context?

RQ2: What is the effect of leadership for innovation on team identity in an open innovation context?

RQ3: What is the relationship between stakeholder integration and the innovation team identity?

RQ4: What is the relationship between leadership for innovation, stakeholder integration, and team identity in an open innovation context?

RQ5: How can leadership for innovation, stakeholder integration and team identity lead to effective open innovations throughout the construction project lifecycle?

1.4 Research scope:

The thesis obtains insights as to how product/design innovation occurs throughout the lifecycle of a construction project including the preparation, design, preconstruction, construction and operation phases. The maintenance phase is excluded in this research as the case studies were at the construction phase at the time of data collection. The design/product innovation in the context of this research can be a single sustainable design/product, which is novel to those involved in the project, or the use of multiple design/products to produce a sustainable project. This choice is consistent with Zaltman et al.'s (1973) definition of innovation as "an idea, practice or material artefact perceived to be new by the relevant adoption unit." This highlights two key components to deliver innovation: 1) it is novel in the eye of the beholder, and 2) it is adopted in practice. In addition to studying innovation, the role of project stakeholders including the clients, designers, contractors, suppliers, and external bodies in stimulating and implementing innovation at the different stages of the project lifecycle is investigated. Furthermore, this research illustrates the key leadership characteristics, stakeholder integration activities, team characteristics, and broad decisions that require consideration across the innovation process (initial, formulation and development, implementation phases) and throughout the project lifecycle.

1.5 Contribution to knowledge

This thesis provides an original contribution to knowledge by developing an understanding of the effect of stakeholder integration on innovation effectiveness in an open innovation context in construction projects. The research delivers empirical evidence of how stakeholder integration leads to more effective innovations through developing a conceptual framework that consists of the main factors that have an influence, and are influenced by, stakeholder integration. These factors are identified and synthesized through a thorough review of the existing literature.

1.6 Structure of the thesis

The thesis consists of eight chapters and its structure is illustrated in Figure (1-1).

Chapter 1 establishes the research motivation, background, problem and rationale. It presents the main research aim, its objectives and the structure of the thesis.

Chapter 2 critically reviews the related literature on the research problem. This includes literature related to the context of this research, which is sustainable construction projects that use open innovation. In addition, this review of the literature addresses a group of concepts related to the main constructs of the research, which are open innovation, stakeholder integration, leadership for innovation and team identity within the generic and the construction sector context.

Chapter 3 clarifies the identification, definition, analysis and synthesis of the main constructs of the research. It provides an operationalization of the constructs and builds the initial conceptual model of the thesis.

Chapter 4 elaborates on the chosen research methods used in this study. It provides a comprehensive overview of the selected research methods and their deployment in this thesis.

Chapter 5 provides a description of the three cases used in this research based on official documents, conversations with officials and field observation.

Chapter 6 presents the case study results and interpretation of the data obtained from the interviews.

Chapter 7 presents the discussion of the relevant findings and assembles the outcome of this into an assessment and evaluation of the initial conceptual model. The chapter then revises the conceptual model and after noting some of the major limitations of the study makes recommendations for future research.

Chapter 8 is the concluding chapter that summarizes the overall research and presents its contributions.

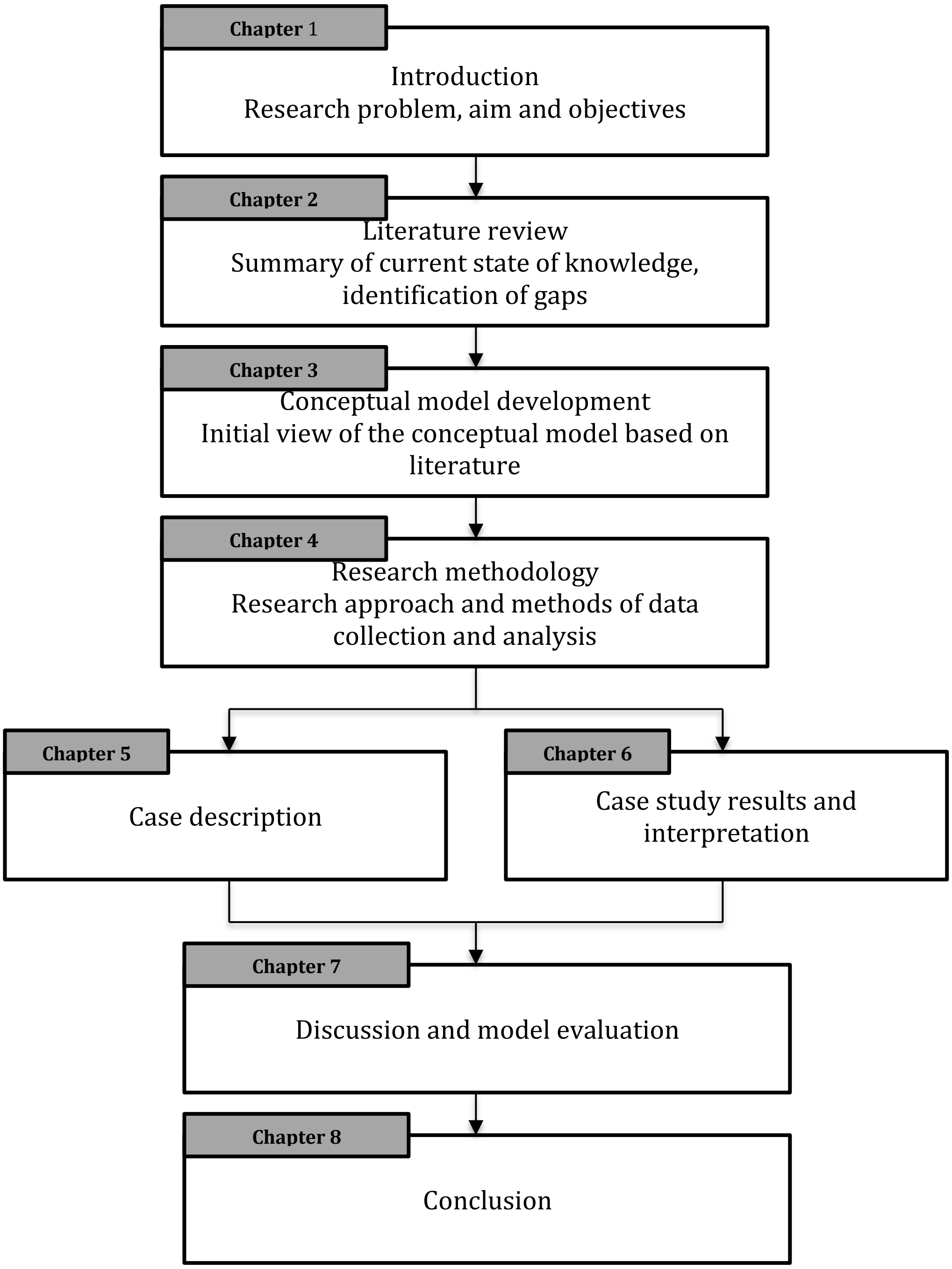


Figure 1-1: Structure of the thesis

Chapter 2- Review of the literature

Introduction to Chapter

The main purpose of this chapter is to provide a comprehensive review of the existing literature relevant to the fundamental aspects of innovation and stakeholder integration within both the generic context and the specific setting of the construction industry. More importantly, past research and empirical studies have been critically reviewed to develop the underpinning theoretical concepts for this study.

This chapter begins in section 2.1 with an overview of the sustainable development concept, its emergence, related international policy, definitions, and relationship to the construction sector, since this research specifically studies sustainable construction innovation. Section 2.2 then provides a review of the various definitions, dimensions and related factors that influence innovation. This is followed by Section 2.3, which explains the construction project lifecycle and the various procurement methods in construction. Then, in section 2.4, the innovation process is considered discussing the different phases to deliver the innovation and the importance of the alignment between both the construction project and the innovation process is demonstrated. This is followed by section 2.5, which details the theories of stakeholders, stakeholder networks, and stakeholder integration and relates them to the innovation literature. Section 2.6 discusses the issue of leadership for innovation followed by section 2.7, which elaborates on the concept of team identity. Section 2.8 identifies the research problem and the main gaps in the literature that needs to be considered. Finally, section 2.9 summarizes the chapter.

2.1 Sustainable development: an overview

2.1.1 The emergence of sustainable development

The rapid increase in human population, the finite nature of fossil resources, climate change and global warmth, biodiversity degradation, and the recent financial crisis were all calls for action by nations to move towards a more sustained way of development and a better system of welfare generation. This pressure has encouraged and contributed to the advancement of the concept of sustainable development.

Historically, the concept was present in the changing concepts and ideas about ‘development’ (Bebbington 2001; Mebratu 1998). Mebratu (1998) discussed the historical background of human development and how it resulted in defining the relationship between humans and the environment. He explains the changes that human development underwent and the effects on nature of societal progress and growth such as the industrial revolution. This in turn led to dramatic changes in social structures and the world population. Mebratu explains how food supply, technologies and man-made chemicals raised fundamental concerns about the security and predictability of the environment. These concerns and criticisms can be found in many publications during the 1960’s and 1970’s such as Silent Spring by Rachel Carson (1962) and Small is beautiful by Schumacher (1973).

The main difference between past concerns and today’s developments is the speed of change. Previous concerns about human impacts on the environment were often less dramatic during an individual’s lifespan. Today, change to the natural environment is happening at a very rapid pace, making it harder for it to be coordinated and controlled (Liao et al. 2013). The current situation shows regular degradation of natural resources and higher levels of global poverty, which has raised doubts in the ability of the current social and economic institutions and organisations' practices to address the needs of the world's population (Yigitcanlar & Suharto 2015). Thus, concepts of sustainable development extend way beyond being solely an environmental movement and consider a wide diversity of social and economic factors influencing human well-being, society and the physical environment.

2.1.2 International policy for sustainable development

The first time that people formally convened to officially discuss the effect of economic development on the environment in both the developed and the developing countries was in the UN Conference on Human Environment (UNCHE) in 1972 (Dresner 2008; Kates et al. 2005). Following that UN initiative, the idea of a 'sustainable society' was raised in the 'Science and Technology for Human Development' conference that was held by the World Council of Churches in 1974 (Dresner 2008). In this conference, social concerns such as equality and democratic decision-making were more emphasized than were environmental concerns in this conference. Little emphasis was placed on the need to function within the carrying capacity of the earth (Dresner 2008).

In 1984, The Brundtland Commission was formed with 22 representatives of developed and developing countries. The Commission's task was to develop a 'global agenda for change' to propose strategies and agendas to achieve sustainable development (WCED, 1987). Towards the end of the 1990's, sustainable development had gained global recognition especially after the United Nations Conference on Environment and Development (UNCED) held in 1992. This conference which is also called the 'Earth Summit', proposed actions to achieve sustainable development in the future. In this summit, hundreds of representatives of national governments and non-governmental organizations adopted Agenda 21 calling all nations to develop sustainable development schemes (Elliot 1999).

In 1997, the Kyoto Protocol was developed, led by the United Nations Framework Convention on Climate Change (UNFCCC) aiming to reduce the emission of Green House Gasses (GHGs). Ever since this protocol, a heavier burden has been assigned to the industrialized countries due to the higher rates of GHGs emitted from their industrial activities (UNFCCC 2012). Since then, organized activities such as conferences, treaties and action plans have been developed continuously at national and international levels.

While the concept is realized globally, many misunderstand its original essence leaving opening doors for debate and disagreement (Blair & Evans 2004; Daly 1991). The following section discusses some attempts to define sustainable development examining different perspectives in an attempt to better understand it in context.

2.1.3 Defining sustainable development

Towards the end of the 1980's, the first universally accepted definition of sustainable development was presented by the World Commission on Environment and Development (WCED) which is commonly known as the Brundtland definition: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987, p. 43). Ever since this 'vague' definition; sustainable development has been used widely because it allows open interpretations of the term. This has led to some extent to jeopardizing its practical implementation since any action, whether it is related to its original essence or not, might be justified under this broad umbrella term.

Pezzey (1989) presented an explanation of sustainable development based on an economic perspective. He argued that development is sustained if ‘well-being’ (per capita) does not decrease at any point along the development path. This makes ‘wealth’ a basis of future well-being. Pearce (2006) was influenced by this definition and used it to define sustainable development as ‘rising per capita well-being over time (p. 202).’ He added that individuals are the best judges for assessing the state of their well-being and hence they make choices and decisions accordingly. Achieving this goal is very complex and individuals need the capability (assets or wealth) to achieve it. There are different types of assets as argued by Pearce (2006); man-made capital, human capital, environmental capital and social capital.

Although some assets are not in material form such as safety and education, they are usually closely allied to material forms of assets such as the infrastructure for education, safe access to drinkable water, etc. These assets are either derived directly from nature or through economic activities such as exchange of materials and labour. In the contemporary world, individuals rarely obtain assets directly from nature. These assets go through a number of processes and a long supply chain. Thus, to achieve sustainability, society needs to understand the interactions and interdependencies that take place within the society itself and between society, environment and economy.

2.1.4 Sustainable development and the construction sector

The construction sector is one of the most challenging sectors in the effort to achieve sustainable development. Due to the amount of environmental damage construction causes through its sizable projects, pressure, for example, from governments and regulators is often put on the sector to use more effective measures to deliver more sustainable projects. Therefore, there is a growing need for countries to assess sustainability in their infrastructure and construction projects using international metrics. This, it has been argued shall be done by incorporating them in harmonious existence with individual countries' needs and priorities (Ugwu & Haupt 2007).

Delivering sustainability within the construction sector requires a shift in traditional practices and use of innovative processes where long-term commitment to an overall vision and related policies and cross-boundary collaboration between and across the supply chain will all play major roles. Innovation in this sector either aims to reduce the consumption of resources or provide better ways of practice or offer improved products, or apply resource management in construction projects. This is usually influenced by the national desire to innovate and the knowledge it diffuses to the sectors and organizations.

Incorporating innovation into sustainable development is particularly difficult (Newman 2005; Toole et al. 2013). Innovation for sustainability, whether it is incremental or radical is complex and multidimensional; a single entity is unlikely to have the available resources to innovate effectively for sustainability. The process is embedded within multiple actors, each of whom may have different perspectives and interests (Rihani 2002; Toole et al. 2013). Therefore, more research and collaborative efforts among organizations, their partners and their stakeholders is needed to better understand the effects of innovation and achieve more effective innovation processes and outcomes.

2.2 Innovation

Innovation is not rooted in a specific discipline or school of thought and it can be conceptualized in different ways. It is applied to a variety of contexts and can have multiple dimensions and levels of analysis. Thus, it is necessary to understand the related theories and concepts of innovation and use them in ways that will serve the purpose of this research.

2.2.1 Definitions of innovation

Innovation in general terms means a new idea is implemented. It is then conceptualized according to the context it is used in. A number of areas of innovation have been researched and explored by many scholars such as Tidd & Bessant (2009) who studied types of innovation, Van de Ven (1986) who explored the management of innovation and Damanpour (1984) who assessed its performance.

The multiplicity of areas and contexts of innovation has led to the existence of various definitions and opinions about its nature. Joseph Schumpeter is considered the first person to highlight the importance of innovation in the field of economy (Hagedoorn 1996). He explained in his book '*The Theory of Economic Development*' that innovation constitutes 'new combinations' in routine economic growth that lead to a dynamic change. The new combinations are exemplified in a new or better quality product, a new method, a new market, a new source of supply, or a new organization of any industry (Hagedoorn 1996). Since these were the first attempts to understand innovation and technological advances, the definitions and related aspects have often been criticized as too vague and broad.

Everett M. Rogers was one of the most influential scholars in the development of the theory of innovation diffusion. In his book '*Diffusion of Innovations*' (1962), he defined innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (in Rogers 1983, p.11). Thus, according to him, the idea is not necessarily new objectively. Zaltman and colleagues shared most of Rogers's ideas and almost the same definition, however, they state that the unit of adoption can be larger than an individual such as an organization (Zaltman et al. 1973). This idea was widely adopted especially in organizational innovation studies.

Van de Ven (1986) added to Roger's and Zaltman et al.'s definition of innovation that it can be "a new idea, which may be a recombination of old ideas, a scheme that challenges the present order, a formula, or a unique approach which is perceived as new by the individuals involved" (p. 591). Based on these definitions, many scholars have then attempted to define innovation influenced by their contexts and perspectives.

2.2.2 Types and dimensions of innovation

Innovation can be employed in different contexts as discussed earlier. Zaltman *et al.* (1973) differentiated three contexts in which innovation is engaged. First, when it produces a new configuration through a creative process. The second context is when it uses a previous innovation and embeds it in a particular unit. And finally, when it uses the novelty of a new idea regardless of how it is invented or how it became a part of a particular unit.

Damanpour and Evan (1984) further support Zaltman's contexts as they consider innovation as "responses to environmental change or means of bringing about change in an organization" (p. 393). Thus, innovation can be considered as the organizational activity that responds to the change of the environment. Any organizational activities that cope with change and uncertainties such as inventing, seeking, acquiring, adopting and implementing new ideas, methods or technologies are considered innovation in this case.

Daft (1978) and Van de Ven (1986) classify innovation in being either technical revealed in a product, service, or technology, or administrative reflected in a new process or organization. Zmud (1982), however, contends that Daft's (1978) theory only focuses on the organization as the unit of analysis and asserts that the product or process can also be units of analysis. Tidd and Bessant (2009) developed Zmud's (1982) argument further and identified different types of innovation. They proposed that a new idea can result in a product innovation where a change in a product and service takes place; a process innovation where a change in the way they are created and produced happens; a position innovation where a change in the context of the product or service is introduced or even a paradigm innovation where a change in the mental models of the organization occurs (Tidd & Bessant 2009).

System level innovation is another categorization, indicating fundamental changes to the entire system, not only on the technical side but also on the user side (Geels 2005). It encompasses product and process innovations and also changes in user practices, markets, policy, regulations, culture, infrastructure, lifestyle, and management of firms (Geels 2005). A component level innovation, on the other hand, is the creation and/ or implementation of a new element or the improvement of them. These two levels of innovations can be radical or incremental. Radical innovations cause transformations and fundamental changes while incremental innovations produce minor changes (Tidd & Bessant 2009).

2.2.3 Innovation in construction projects

2.2.3.1 Innovation from the construction industry perspective

The construction industry is viewed as one of the mature industries characterized by a slow pace of change, although importantly innovation is required as a source of competitive advantage (Eaton *et al.* 2006). In the context of construction, innovation is defined by Slaughter (2000, p.2) as "a nontrivial improvement in a product, process, or system that is actually used and which is novel to the company developing or using it." The successful development of new ideas, processes or products in order to increase the organization's efficiency and performance is a definition of innovation that has been widely used in the construction field (Egbu *et al.* 1998; Sexton & Barrett 2005).

According to Peansupap (2004) innovations in construction can be categorized into:

(1) Innovation in materials, equipment and methods. These have direct influence on construction productivity and deliverables, therefore, they can be considered as technical product or process innovations. Often, this specific type of innovation is termed, construction innovation. Innovations in this category are not necessarily new technology, they can be equipment devised

from existing resources or methods developed to solve a specific problem. Examples are recycled concrete, remote controlled equipment and off-site manufacturing techniques.

(2) Management innovation, which includes new management techniques that facilitate the process of management and administration such as Total Quality Management and design-build contracts. These innovations can be considered as administrative process, and technical process innovations.

(3) Information technology innovation refers to the electronic infrastructure and equipment, which can be either software or hardware. Recently, most IT applications in the construction industry are in the form of computer applications such as computer assisted design (CAD) systems and building information modelling (BIM). For several decades, IT has played a vital role in streamlining business and industrial processes. It has provided many industries with numerous benefits in terms of the promptness of operation, the steadiness of data generation, and accessibility and exchange of information (Stewart & Mohamed 2004).

In addition to this classification, Anderson and Schaan (2001) categorized construction innovation as advanced technologies and advanced practices.

(1) Advanced technologies comprise communication technologies such as email, on-site plant and equipment technologies like GPS, advanced materials such as high performance concrete, advanced systems as remote sensing and monitoring systems, and CAD and BIM technologies.

(2) Advanced practices comprise computerization as in computerized inventory control, quality management and ISO 9000 certification, organisational practices such as written strategic plans, and business practices such as PPP contracts.

This classification has been widely accepted and employed in the national surveys conducted in both Canada (Anderson & Schaan 2001) and Australia (Manley 2005) to study the level of innovation in the construction industry.

2.2.3.2 Levels of innovation in the construction industry

Many researchers investigated the level of innovation in different industries, including construction. They can give insights on innovations globally by comparing and contrasting the different levels of innovation in different industries or within the same industry. This section presents some examples of reported innovation levels within the construction industry from three countries (UK, Canada, and UAE).

United Kingdom

The data that represents London's level of innovation in construction is derived from the 'UK Innovation Survey 2015' (Hooker & Achur 2016).

The survey studied innovation in UK during the period 2012 to 2014. It is evident that more UK businesses reportedly were involved in innovation than in the previous survey period of 2010 to 2012. Similarly, in the 2016 European Innovation Scoreboard, the UK was ranked as a 'strong innovator', in eighth position amongst EU countries, remaining above the average level of innovation within the 28 member states of the European Union (Levanti 2016).

The UK Innovation Survey 2015 defined innovation activity according to whether enterprises:

- Presented a new or significantly improved product or process
- Engaged in innovation projects that are not yet complete or have been abandoned
- Developed new and significantly improved forms of organization, business structures or practices and marketing concepts or strategies
- Invested in areas such as internal research and development, training, acquisition of external knowledge or machinery and equipment linked to innovation activities (Derived from Hooker & Achur 2016).

The survey sampled 29,732 UK enterprises with ten or more employees. It found that forty two percent of businesses engaged in one or more types of non-technological innovation over the latest survey period. Over a quarter mentioned the implementation of new business practices for organizing procedures.

The survey identifies the different types of external resources used to achieve innovation in the enterprises:

- Internal: from within the enterprise itself or other enterprises within the enterprise group;
- Market: from suppliers, customers, clients, consultants, competitors, commercial laboratories or research and development enterprises;
- Institutional: from the public sector such as government research organisations and universities or private research institutes;

- Other sources: from conferences, trade fairs and exhibitions; scientific journals, trade/technical publications; professional and industry associations; technical industry or service standards (Derived from Hooker & Achur 2016).

Overall, internal sources were rated as the most important source of information for innovation. Market sources were also given as important information sources. A quarter of businesses (25%) cited 'suppliers' as a source of external sources used to achieve innovation in this survey, whilst 20% mentioned 'clients or customers from private sector'. Thirteen percent cited the category of 'competitors'. The least frequently cited sources were 'institutional' sources. Only 3% mentioned 'universities or other higher education institutes', while 2% cited 'Government or public research institutes'.

From the sample, 47% of the construction firms reported that they had engaged in innovation activities, the lowest level from the 15 major industries; however, the percentage shows a significant increase since the previous survey which indicates a developing awareness of its importance. Hence, there is a need for more research and frameworks to encourage cross boundary collaborations to achieve innovation in the construction sector to enable projects and firms to measure their competence in achieving effective innovations.

The global construction market is forecast to grow over 70% by 2025 (Curd 2016). With the aim that the UK could be at the forefront of this growth, the government and industry produced a joint strategy, Construction 2025, which identifies targets, parameters and measures to meet the aspiration of the UK being a leader in the global construction industry. The strategy is based on a clear and defined set of targets for the industry, including lowering costs, faster delivery, lower emissions, and improvement in exports. To meet these targets and achieve competitive advantage the industry needs a drastic transformation through sharing and encouraging innovation and innovative practices to increase productivity (Curd 2016). The Institution of Civil Engineers (ICE) produced a report in 2015 to engage and advance the industry towards the Construction 2025 strategy. To produce the report, they sought out the leaders who had taken the plunge to embed innovation to understand the key obstacles and how they could be overcome to enable innovation. They studied ground-breaking projects to see how innovation was being driven forward to achieve its goals. They recognised that creating added value for teams and clients, improving productivity and facilitating a culture where innovation can thrive to exceed project expectations is key to innovation in the sector. They stressed that teams need to be capable of delivering effective innovations; therefore, teams should be composed of the right people with the right skills that provide a collaborative environment and facilitate innovative thinking. They also argued that incentives are vital to drive successful innovations within the team. The report also mentioned the importance of leadership for innovation. Leaders need to offer high level support in a clear and consistent manner, as well as setting out a vision for how their organisations should address the challenge. In general, they recommended that communication, governance, skills, training and development, and enduring diversity within teams are all vital dimensions for successful innovation in the construction sector (ICE 2015).

Canada

A construction industry-specific innovation survey was distributed in Canada in 1999 under the title 'The Survey of Innovation, Advanced Technologies and Practices in the Construction and Related Industries' (Anderson & Schaan 2001). The survey population was based on a compilation of the sample units defined in the Statistics Canada's Business Register. A sample of roughly 2,500 units was randomly drawn from the population excluding enterprises with revenues less than $50,000. The response rate was 75% with 1,800 usable questionnaires. The survey assessed the level of innovation in construction firms based on their 'current use' and 'intention to use within 2 years' advanced technologies and advanced practices.

In the survey, the advanced technologies were organized under five categories (Adapted from Anderson & Schaan 2001):

- Communication technologies (email, digital photography for reporting, office-to-site video links or video conferencing, and company computer networks)
- Materials (high performance concrete, composite materials, and recycled plastic components)
- On-site plant and equipment (laser-guided equipment, automated systems and programmable machines, and GPS)
- Advanced systems (remote sensing and monitoring systems, bio-remediation clean-up, preassembled air, water, power distribution systems, clean room technology, and deconstruction and reuse systems)

- Design technologies (CAD, modelling or simulation technologies, and electronic exchange of CAD files)

Email had the highest percentage of use (38%) among all of the technologies, followed by the company computer network (25%) and CAD (23%). The top technologies intended to be used within the next 2 years were email (25%), CAD (15%), and electronic exchange of CAD files (14%).

The advanced practices were divided into four categories (Adapted from Anderson & Schaan 2001):

- Business (design-build contracts, BOT contracts)
- Computerization (computerized inventory control, computerized estimating software, and computerized project management and/or scheduling systems)
- Organization (written market analysis reports to evaluate business needs and opportunities, written documentation of technological improvements developed, written evaluation of new ideas in order to develop business options, and written strategic plans)
- Quality (quality certification such as ISO 9000).

The largest percentage of the practices was that of design-build contracts (32%) followed by the computerized inventory control (31%), and the computerized estimating software (29%). The practices planned to be used within the next 2 years were mainly computer-related such as computerized estimating software (23%), computerized inventory control (20%), and computerized project management/ scheduling systems (17%).

Although the survey was issued nearly 20 years ago, it is one of the few comprehensive surveys that focuses specifically on the construction sector, hence, it is still beneficial for gaining insight on the overall patterns and the level of innovation in the past.

United Arab Emirates

The UAE ranked first in the Middle East for overall performance in the 2014 Global innovation index published by Cornell University, the European Institute for Business Administration (INSEAD) and the World Intellectual Property Organization. Since the thesis is based on empirical case studies from the city of Dubai in the UAE, this section specifically addresses reported levels of innovation in this particular Emirate.

The ruler of Dubai HH Sheikh Mohammed Bin Rashid Al Maktoum launched the National Innovation Strategy in August 20, 2014, stating: "The UAE is already the most innovative Arab nation. Our target is to be among the most innovative nations in the world. The competitiveness race demands a constant flow of new ideas, as well as innovative leadership using different methods and tools to direct the change" (Holzer 2017).

To stimulate innovation in the city, The National Innovation Strategy was developed. In the first phase, there are 30 national initiatives that are targeted to be completed within three years. These include new legislation, innovation incubators, and investment in specialized skills, private sector incentives, international research partnerships and an innovation drive within government. This strategy is a part of the national vision for development and progress and a tool to achieve the UAE Vision 2021, which aims to establish the world's most innovative government. Therefore, various public and private sector events have been held to boost innovative thinking and enhance creativity (Holzer 2016).

Dubai Chamber of Commerce & Industry released the Dubai Innovation Index (DII) Report in February 2016. Dubai Chamber launched DII in collaboration with PwC in 2015, to support UAE's vision for innovation (Dubai Chamber 2016). The Index provides a comparison between Dubai and 28 global cities on macroeconomic measures of innovation and analyzes innovation performance of Dubai's private sector, including activity at the firm level. The index aims to spread awareness and inflate private sector participation in the total innovation efforts of the city in addition to providing a benchmark to measure innovation (Dubai Chamber 2016). In the Report, Dubai ranks 16th across 28 global cities. London emerged as the most innovative city, followed by Hong Kong and Singapore respectively.

The Index covers 800 companies, with SMEs accounting for 60% of the participating companies. Manufacturing, professional services, marketing and events account for 13% of the companies that participated in the survey and 12% of wholesale and retail trade. Travel and hospitality report 11% and finance and insurance report 10%. Companies from the energy and information technology sectors only represent 6% and healthcare, real estate, and construction represent 5%, while companies from the transport and logistics sector cover 4% of the responses only (Dubai Chamber 2016).

The Healthcare industry scored that highest in innovation for private sector industries, with a score of 60.25, whereas the Construction industry scores amongst the low performing industries in innovation. The aim of the index is to understand the challenges and opportunities faced by the sectors when it comes to innovation in order to take measures and actions to promote innovation. The index has enabler and performance measures for innovation. Dubai has scored well in “Government support” and “building the culture of innovation”, while it scored low in “infrastructure for innovation” and “skills and talent” which indicates that these areas demand improvement.

Furthermore, the index contains 61 indicators to measure innovation. The indicators show a positive level of innovation in the launch of new products and services and outputs from technology. However, intellectual property and opportunities for collaboration with institutions and economies for scientific work need some more attention. The survey also shows that there is weakness in terms of “implementation of ideas” and “retention of talent” which lead to a low score for “intellectual capital”. In addition, the analysis revealed the significant role of the public sector in driving the innovation agenda and the importance of the collaboration between the public and the private sector to achieve the city’s vision for innovation.

In summary, the innovation surveys presented in this section have provided a broad perspective on the level of innovation as well as the different types of innovation in different countries. Noticeably, the level of innovation within the construction industry appears to be generally low, especially when compared with other major industries and there was no reference to construction in the UAE innovation analysis, which further encourages the researcher to promote for open innovation in the construction sector in the UAE. This low level of innovation has also encouraged other researchers to conduct various studies, in an attempt to identify potential factors that need to be addressed to improve the current level of innovation within the industry. The following section provides a review of these research studies.

2.2.3.3 Factors influencing innovation in the construction industry

As presented in the previous section, several large scale empirical surveys have found a low level of innovation in the construction industry (Ozorhon et al. 2010). It is commonly accepted that the nature of construction projects is the main obstacle to innovation. A construction project is known for its fragmented supply chains, difficulties with bringing stakeholders to agreements, and poor cross-communication and knowledge management. These factors constrain the generation or adoption, implementation and diffusion of innovations (Blayse & Manley 2004; Aouad et al. 2010).

Since the effective management of construction projects necessitates collaboration and coordination among multiple stakeholders inside and across supply chains, the supply chain itself is considered the *primary stakeholder* of the innovation project. In the construction industry, the supply chain can be interpreted as an 'extended enterprise' where the different parties (project developer, architect, engineering firm, contractor, subcontractors, suppliers) operate as business units in collaboration representing the different functions they deliver (marketing, design, engineering, components manufacture, supply, assembly, delivery) for an entity regardless of who owns them (Cooper & Rousseau 1999). It is a make-to-order supply chain that consists of three major operating subsystems according to Voordijk & Vrijhoef (2003): the specification, design and engineering of the end product. This includes all of the materials that are required in the supply chain according to the information, drawings, manufacturing of materials and components; and the assembly of the end product that is specified which requires many kinds of innovative technologies.

In the context of construction megaprojects, it is not enough to deal with the supply chain as it is commonly and widely known; extensive intra and inter-organizational coordination is required. Recognizing changes in the competitive environment and accordingly structuring the resources and supply chain to effectively meet the customers' real demands is crucial. Also, it is important to ensure effective integration and coordination of the different parties in the supply chain for achieving outstanding performance (Fawcett & Magnan 2002; Ozorhon et al. 2014).

In conducting a survey of a group of innovative companies in construction, Egbu et al. (1998) found that an organizational culture enabling flexibility in communication is a major positive influence. Mitropoulos and Tatum (1999) also argued that a culture in the organization that values innovation is important for adopting innovations. They added that management's attitudes towards new technology and their ability to realize improvements to existing practices are crucial factors influencing innovation. Tabassi et al. (2016) argues that leadership competencies, transformational leadership and intellectual competence of project managers play the most significant role in sustainable construction because of their ability to create an innovative culture. Alwan et al. (2017) agreed with previous researchers who have argued that an ineffective leadership, ingrained cultures, outdated technologies, poor logistics and lack of using solutions such as BIM (Building Information Modeling) are major obstacles to sustainable innovation in construction.

Dulaimi et al. (2002) conducted a survey with Singaporean construction organisations and observed that providing resources that enhance the creativity of staff is crucial such as seminars, conferences and training courses. In addition to that, they concurred with Cousin's (1998) view of the importance of establishing a rewards system, which recognizes innovators and promotes innovation. In relation to leadership, Nam and Tatum (1997) drew attention to the importance of the role of champions and leaders to develop and deliver successful innovations. Blayse & Manley (2004) identified and summarized the major influencers of innovation as the culture of the organization, absorptive capacity, innovation champions, knowledge codification and an innovative strategy. Allen and Cohen (1969) were one of the first researchers to propose that innovation should shift from solely responding to formal organizational structures towards being supported by contexts that facilitate more informal relationships between individuals and groups across the organization. This encouraged more researchers to pay attention to network structures and its effects on innovation (Björk & Magnusson 2009; Sammarra & Biggiero 2008).

Certainly, a group of scholars have made a substantial effort to enrich the body of knowledge regarding the influencers of innovation in the construction field especially when it comes to considering the role of organizational culture as seen in Table 2-1. Nevertheless, few research studies link these influencers with stakeholder management and networking techniques to facilitate innovation. Consequently, more empirical studies are required to increase our knowledge and understanding on how stakeholder integration can affect innovation in the construction industry and how the management team can encourage positive relationships supportive of innovation.

Table 2-1: Factors affecting innovation

Main Factors affecting innovation	Sub-Factors affecting innovation	References
Organizational culture for innovation	Open communication. Flexibility. Risk tolerance. Resource availability. Reward scheme. Management attitude toward innovations.	Dulaimi et al., 2002 Ebgu et al. 1998 Slaughter, 2000 Mitropoulos and Tatum, 1999 Nam and Tatum, 1997 Peansupap and Walker, 2005 Stewart et al., 2004 Tabassi et al. 2016 Ville & Yang, 2017 Alwan et al. 2017
Leadership for innovation	Leaders and champions Supervisory support for innovation.	Nam and Tatum, 1997 Peansupap and Walker, 2005 Yukl, 2012 Ozorhon, 2013 Tabassi et al. 2016 Ville & Yang, 2017 Alwan et al. 2017
Team climate for innovation	Supporting colleagues help.	Peansupap and Walker, 2005 Panuwatwanich et al. 2008 Chan and Liu, 2014
Stakeholder integration	Intra and inter-organizational coordination. The Integration and coordination of the different parties.	Fawcett & Magnan 2002 Ozorhon, 2013 Naoum & Egbu, 2016 Murphy et al. 2011 Aouad et al. 2010

In addition, unfortunately researchers have tended to ignore the project level by focusing mainly on the firm level due to the difficulty of tracking the various activities undertaken by the heterogeneous stakeholders in the many stages of a construction project (Ozorhon 2013; Ozorhon et al. 2010; Murphy et al. 2011; Blayse and Manley 2004; Dulaimi et al. 2002).

Innovation in construction projects is often co-developed with a variety of stakeholders such as clients, contractors, subcontractors, suppliers, consultants, and designers each with a specific role in the innovation project. Clients for instance can nurture innovation by applying pressure on other stakeholders to improve performance in response to a high standard demand or a novel requirement. While contractors usually implement and exert pressure and encourage subcontractors to actually participate in the innovation, it is often manufacturers that develop the product and/or process innovation. In considering this multidisciplinary, multiparty environment in the construction field, an analysis of innovation at the project level crossing organizations boundaries could produce more relevant data to assist with identifying the conditions under which innovation can be effective in a construction project setting (Ozorhon et al. 2010; Ozorhon 2013; Murphy et al. 2011).

2.2.4 The emergence of open innovation

As mentioned in section 1.1, construction projects are highly multidisciplinary and involve various stakeholders that have to be coordinated and communicate effectively for the achievement of innovation. The process requires cross-boundary collaboration and communication and eventually the integration of stakeholders.

Nevertheless, different types of innovation managed to emerge historically within the boundaries of the coordination and control of the firm often based on the assumption that companies must generate new ideas by themselves across the process of development, manufacturing, marketing and distribution. For years, this concept of 'closed innovation' was perceived to be the right way of behaving in the construction industry. These assumptions required substantial investments in R&D and hiring the brightest people in order that the organization could reap most of the profits. This approach necessitated elaborate formal and informal systems of protection of their intellectual property to prevent others from stealing their ideas (Chesbrough 2003).

Chesbrough (2003) and Heap (2010) argue that the growth of companies in the 20th century, the increasing number and mobility of knowledge workers, globalization and greater ease of knowledge transfer and private venture capital markets are all factors contributing to make protection of intellectual property very difficult. These phenomena have encouraged more organizations to consider adoption of *open innovation*. The idea of open innovation is not entirely new, although it wasn't termed as such. Forms of open innovation have been used in the construction industry as the nature of projects require cross-boundary collaboration within the supply chain. Nevertheless, traditional ways of collaborating in the supply chain often concentrate on the primary stakeholders of the construction work, while ignoring secondary and invisible stakeholders which can have a detrimental influence on project performance and the final innovation product. Therefore, open innovation strategies that are known today have the potential to overcome many of these problems and constraints.

Since the last decade, open innovation has become "one of the hottest topics in innovation management" (Giannopoulou et al. 2011, p. 505; Huizingh 2011, p. 2). Several reviews of research on open innovation have been published (e.g. Huizingh 2011; Lichtenthaler 2011; West and Bogers 2014), however, evidence of the practical implications and benefits of open innovation are scarce and still in the developmental stage (Giannopoulou et al. 2011).

Authors such as March (2008) realized the need for chasing external intellectual sources of knowledge; he proposed the concept of exploration/exploitation in the early 1990s, which resembles the idea of open innovation. Hruby (1999) argued the importance of cutting-edge companies adopting innovation generated outside their limits. Hamel (2000) and Hagel III (2002) have acknowledged the importance of new models of open innovation, as was later explored by Chesbrough (2006), recommending that companies build or redesign their business models in an open format to develop new value logic.

Chesbrough (2006) is considered the first scholar to define the term ‘open innovation’. He stated that open innovation is “the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively (Chesbrough 2006, p. 2).” Unlike closed forms of innovation, open innovation uses external ideas and paths ha nd-in-hand with internal ideas and paths-to-market in order to create value in the organization and take the ideas into the market through external channels to generate additional value.

In open innovation, knowledge is transferred if it provides value to the organization. This happens through removing the intellectual property restraints and creating new ways to profit from other users of this innovation. This can happen through licensing agreements, joint ventures and other arrangements (Heap 2010).

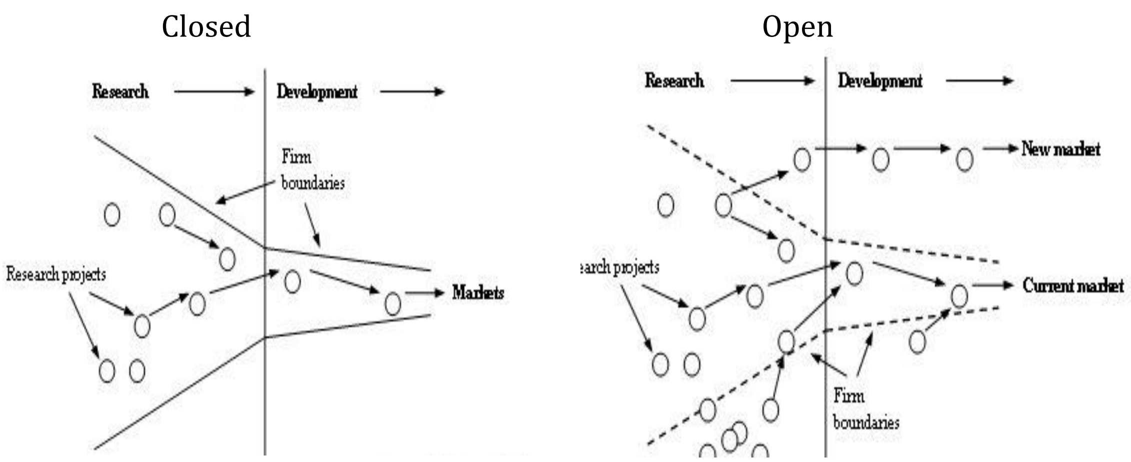


Figure 2-1: A model illustrating closed innovation and open innovation (Chesbrough 2003, p. 36-37).

The open innovation model shows three processes: The first one is the *outside-in process (inbound)* which depends on escalating the knowledge base of the organization through the integration of stakeholders which can lead to increasing the innovativeness of the organization (Laursen & Salter 2006; Lettl et al. 2006; and Piller & Walcher 2006). Enkel and Gassmann (2008) found in their study that knowledge sources are mostly through clients (78%), and then, suppliers (61%), competitors (49%), and public and commercial research institutions (21%). They also identified from their survey sample that 65% of the sources are non-customers, non-suppliers and partners from other industries which is a very interesting and critical fact when it comes to discussing the significance of innovation networks and new forms of integration.

The second process of open innovation is the *inside-out process* (outbound) which refers to profiting through bringing ideas to markets, selling intellectual properties, multiplying technologies through ideas transfer (Enkel & Gassmann 2009). Revenue is received through licensing fees, joint ventures and spinoffs, which Gassmann & Enkel (2004) and Lichtenthaler & Ernst (2009) claim to be more profitable than innovation.

The last process of open innovation is the coupled process, which promotes the co-creation with complementary partners achieved by establishing alliances, cooperation, and joint ventures as means of stakeholder integration (Enkel & Gassmann 2009). This process combines the outside-in and the inside-out processes to develop and commercialize innovation at the same time. This process of innovation focuses on communities, consumers, lead users, universities or research organizations and partners from other industries (Enkel & Gassmann 2009).

The networked nature of open innovation allows for more innovation opportunities argued Saint-Paul (2003, p. 3), who stated that “In an industry with, say, 10 firms similar in output and investment in R&D, each member of a nine-firm technology cartel [or network] can expect to obtain immediate access to nine times the number of innovations that the remaining enterprise can anticipate on the average.” Koschatzky (2001) shares the same viewpoint claiming that those who do not participate in the network will have to deal with serious competitive disadvantages and may have their knowledge base reduced making it more difficult to continue in exchange relations with other organizations.

This does not mean that there are no risks accompanied with the open type of innovation. A study in 2008 undertaken by Enkel et al. (2009) on 107 companies showed embracing open innovation have generated a 48% risk of losing knowledge, 48% of coordination cost, 41% risk of losing control and facing complexity issues. These risks and obstacles motivate some companies to invest concurrently in closed and open innovations. Enkel et al. (2009) concluded that this issue necessitates more research and empirical studies to identify the cause and effect relationships between open and closed innovations and to find the right integration mechanisms to enrich theory and practice in the field.

2.2.5 Social network and innovation

As is evident from reading the literature on innovation, whether open or closed, is very rarely a closed activity but rather, one involving multiple participants. Even if the entrepreneur finds an opportunity, making an innovation necessitates the involvement of many players. Firms are becoming more aware of the importance of establishing networks with other organizations, getting closer to customers to understand their needs, working with suppliers to better establish solutions to existing problems, benefiting from research centers, universities, and even competitors (Tidd & Bessant 2009).

The role of networks in innovation has been at the centre of attention of many fields of research on innovation. Allen and Cohen (1969) were one of the first researchers to proposed that R&D must change from solely responding to formal organizational structures to more informal relationships between individuals and groups across the organization. Another area of research interest observed is the relationship between network structures and innovation resulting in the current development of methods and tools for social network analysis. This allows the mapping and measurement of network characteristics and their influence in a more explicit and detailed way. Some scholars have studied the effect of social networks on power (Kilduff & Krackhardt 1994), others the network effects on individual performance and individual creativity (Sparrowe et al. 2001). The recent research though focuses attention on the way network structures impact on innovation (Björk & Magnusson 2009; Gould 2012; Hermans et al 2016). However, there is still limited research analyzing the inter-relationships between social networks and innovation and there is a need for more empirical work in this area especially in the construction sector.

Interest in understanding the relationships between social networks and innovation, stems from the fact that innovation is associated with a large number of potential benefits. Tidd and Bessant (2009) promote networking as a source of access to different resources through a shared exchange process providing collective efficiency. Networking offers a shared learning process where partners share experiences, insights, models and practices. The benefit obtained from sharing risk, permits higher consideration of risk, as well as contains its possible negative effects more effectively. Moreover, networking supports the intersection of different knowledge sets opening doors to more innovation stimuli and experiences.

Tidd and Bessant (2009) argued that networks can be either emergent or engineered. The first type of network is formulated as a result of environmental interdependence and common interests, however, the second type is developed and triggered through recruiting members to form a network. Engineered networks can be formulated through a set of different frameworks. The main ones are: Entrepreneur-based network, internal project teams, communities of practice, sectoral networks, new product or process development consortium and sectoral forum (See Tidd & Bessant 2009 for further elaboration). These networks can be internal among the members of the organization or external in order to cross boundaries, facilitate more knowledge, expertise exchange and open innovation.

Nambisan & Sawhney (2007) identified several models such as: the 'orchestra' model which creates an active global network with suppliers as partners and investors and shifts the 'build to print' approach to 'design and build to performance.' The 'creative bazaar' model, which depends on a 'crowd sourcing' approach where the major innovation firm goes shopping for innovation inputs then develops and integrates them further. The 'jam central' model where a central vision is developed then a wide variety of players contribute towards achieving it.

The challenge with open innovation networks is to find the most appropriate stakeholders and learn how to deal with them in addition to motivating internal stakeholders that form the supply chain towards achieving the common goal of innovation. These networks have to be aligned with the lifecycle of the project in order to integrate the project process with the innovation process and target the most appropriate stakeholders for each phase. For supply chains that aim to deliver innovations, it is very important to align the motivation of the different parties that work on the innovation and on the project itself. They will have different interests, which have to be brought towards a satisfactory level of mutual agreement to ensure successful development and implementation of the innovation. The next two sections analyze the construction project life cycle and the innovation process to provide a better understanding of the mechanisms that should take place to integrate the different stakeholders.

2.3 The construction project lifecycle

Understanding the stages involved in construction projects is vital to the current study owing to the need for innovation and stakeholder integration. In this section, an overall view of construction project phases is explained from the perspective of a typical construction project. Following this discussion, the phases are compared with the innovation process to highlight the phases in the project lifecycle that should be aligned to enhance and influence innovation.

Researchers have referred to the project life cycle as the construction period from conception to completion (Jugdev & Muller 2005). The phases of a construction project have been described somewhat differently according to different authors. In his book, The Management of Construction: A Project Life Cycle Approach, Bennett (2003) identified six phases in the construction project life cycle, each with its own purposes and characteristics. The phases are the pre-project phase, planning and design phase, contractor selection phase, project mobilization phase, project operations phase, and finally project closeout and termination phase. This order best describes the traditional design-tender-build method of project procurement. Kagioglou et al. (2000) reduced the stages of construction project to include pre-project stage, preconstruction stage, construction stage, and post completion/construction stage, which better suits the different types of procurement methods. Aaltonen and Kujala (2010) in their study divided the lifecycle of an investment project in construction into three main phases: the investment preparation, project execution and the operation phases. Major decisions about the proposal and the design are made at the investment preparation phase which include the feasibility, planning and design phases followed by the project execution phase during when works are carried out on site based on the decisions made earlier at the design stage. After the execution phase comes the operation phase during which the benefits of the project are expected to be derived.

1. The pre-project phase (investment preparation)

First, in the pre-project phase, the project begins with an idea, a need, a desire to improve productive capacity, or provide more efficient services. At this stage, the appraisal and the design brief is developed. In the appraisal, the client’s needs and objectives are clearly identified and a business case is developed along with possible constraints to the proposed development. It also covers the feasibility studies and an assessment of options to guide the client to whether or not to go ahead with the development. This is accomplished through the use of preliminary studies, relevant information, and statistical projections. Feasibility studies test the various aspects of an owner’s vision. If the vision is not financially viable, it must be substantially modified or abandoned (CSI 2005).

In the design brief at this stage, a general outline of requirements, constraints, and future actions plan is established. It also involves identifying the appropriate/suitable procurement method, procedures, structure and range of consultants and other stakeholders to be engaged in the project (Bennett 2003; RIBA 2013).

There are different procurement systems in construction that range from the traditional design-tender-build method to various methods such as having a single entity responsible for execution of the entire project. The major methods used in construction are explained in the following sections.

Traditional design-tender-build

This method is called 'traditional' because it has been widely used in most of the construction projects during many centuries. With this method, the client contracts with a design professional to prepare preliminary planning, carry out design work and specifications, and prepare contract documents and then contract separately with a construction contractor for the assembly of the project elements in the field. In this method, the contract for the design work is separate from that for the construction work. According to Walker and Hampson (2003), this method is the most conservative and the most detrimental to innovation. It involves the highest cost risk for contractors, the highest incidence of adversarial relationships, the lowest level of integration across the supply chain, and the poorest innovation outcomes (Kumaraswamy & Dulaimi 2001).

Design-build

The important characteristic of this method is the single point contractual responsibility with an organization that becomes responsible for both the design and the construction of the project (CIOB 2010). This method offers a non-adversarial and less challenging environment, greater contractor participation and effectiveness in resolving conflicts and disputes at design interfaces and design and construction interfaces. On the other hand, it can be associated with some disadvantages such as, short tender periods, costly tendering, less control over subcontractors and consultants, potential low quality, and less control by the client over both project definition and execution (Bennett 2003).

Construction management

In this approach, the client may engage a construction manager to provide professional construction management services. The construction manager provides advice to the client regarding construction matters, including cost, schedule, safety, the construction process and other considerations; such advice throughout the project life cycle or at selected points (Bennett 2003).

By engaging an expert advisor early in the process, the owner can achieve an optimal balance of time, cost and quality as this approach gives the benefit of reviewing design alternatives as they are developed. Materials and equipment with long delivery times can be identified and ordered early on in the process, and a team chosen for their professional abilities to act together in the client's best interest from inception to completion of the project. This approach could be perceived as means of passive avoidance of conflicts among project members. However, one of the drawbacks of the system is that the final cost of the project is not known until after the last works contract has been signed (CIOB 2010).

Project Management

In this method, the client turns the entire project over to an independent manager. By adding a project manager between the owner and the architect/engineer and general contractor, the project manager manages the project on the owner's behalf. This arrangement implies that the project manager contracts with the designer and the general contractor. Below the level of project manager, other arrangements are possible. For example, the project manager might decide to engage a single design–build organisation or might employ a construction manager of the type described earlier. This system is fragmented more or less the same way as the traditional procurement, and therefore is prone to occurrence of conflicts if the project manager is not effective (Bennet 2003)

Build-own-operate-transfer (BOOT)

The BOOT method evolved to involve the private sector in the development of public infrastructure. The concept requires the private sector to finance, design, build, operate and manage the facility and then transfer the asset to the government free of charge after a specified concession period (Bennett 2003). The advantages of BOOT projects are the potential for mobilizing the private sector and the access to technologies and skills not available in the public sector. However, one of the disadvantages is the large number of contractually interrelated parties.

Partnering

Partnering is not a procurement method in itself, rather it is an arrangement that involves two or more organisations working together to improve project performance, agreeing mutual benefits, conceiving ways for resolving disputes and committing themselves to continuous improvement, measuring progress and sharing the profits

(CIOB 2010). Successful partnering effectively occurs when mutual trust and understanding takes place between the different parties involved which in turn leads to openness, continuous and structured meetings, economic incentive contracts, and predetermined dispute resolution methods (Naoum & Egbu 2016).

For more complex projects, like the case in this thesis, a design-build, construction management, project management, or BOOT style arrangement can have good innovation outcomes. These approaches integrate design and construction functions (and sometimes financing and operation), which results in enhanced design constructability and economy, through innovation. Communication, learning, and innovation are also improved across the supply chain through management by a single entity. Further, incentives for innovation are enhanced as there is greater scope for capturing benefits (Walker et al. 2003; Kumaraswamy and Dulaimi 2001).

In the CIOB 'exploring procurement' report (2010), it was noted that one of the primary reasons for low productivity in the construction industry is the lack of integration of activities across the project life cycle. Undeniably the traditional design–tender–build approach described above, with its separation of design and construction, has great potential for such lack of integration. The report urges the implementation of the design–build method and partnership for improving productivity.

The ICE report (2015) points out that procurement strategy can greatly influence the scope and capacity for innovation within a project. It further states that the greatest opportunities for innovation are during the initial concept. Several elements in particular play an important role: the role of the client, contract types, and an integrated supply chain. The report notes that the client's ability to steer project direction is a key facilitator in allowing innovation to take place. Defining the scope and emphasising the required outcome and needs rather than being overly prescriptive with a required solution, provides an opportunity for the supply chain to be creative in their delivery. Other than the client's role, the report points out that the traditional construction contracts are not fair in spreading and sharing risk since the client and end user receive reward and value while the consultant or contractor are left behind. Therefore, for innovation to thrive incentives are important. Contracts with pain gain mechanisms can encourage all stakeholders to innovate by sharing both successes and failures as well as spreading the risk and opportunity (ICE 2015).

2. Planning and design phase

Two key things should be accomplished early at this stage. First, there must be a clear understanding of the project's concept (objectives, purposes, scope and nature by both the client/owner and organisation responsible for carrying out the work or at least those members of the project team identified by that time). A brief or other defining document is essential to this process. Second, a relationship between the client/owner and the project delivery organisation or personnel must be established, with clearly defined roles and responsibilities. Consultant selection is one of the very important tasks that the client/owner faces when initiating the project (RIBA 2013).

At this stage, the brief can be developed or enhanced from the initial version developed at the pre-project phase. It specifies the scope of the project and defines the objectives to be achieved. The brief can be prepared by the client/owner even before the project manager or design professionals are engaged or it can be prepared with the help of the project manager or design professionals after they are engaged. The input of experienced and innovative consultants can assist the owner in identifying and clarifying needs and setting forth the project’s scope (Bennett 2003).

A lack of adequate knowledge for developing a project brief with clear targets is a hindrance to sustainable innovation. Setting clear goals is important for sustainable construction since it attends to the environmental, financial and social sustainability factors and the desired rating level of the project alongside the market conditions and physical needs normally considered in traditional construction (Robichaud & Anantatmula 2011). The presence of the innovation element adds to the importance of this stage because there should be a clear definition of the innovation goal for aligning the innovation process with project design decisions (Thomson & Munns 2010). Moreover, the objective of the innovation has to be clearly defined and measurable innovation effectiveness parameters have to be set whether concerning financial returns, competitive advantage, or people development. These parameters include meeting technical targets, specifications regarding product quality, the level of stakeholder integration, the client or user satisfaction desired, and indications of future success.

After the brief, a more comprehensive statement of the elements must be developed, elements that will be translated into the physical aspects of the completed project. This is achieved through developing a programme followed by the identification of alternatives, site investigation, constructability analysis, public input, code analysis, preliminary cost estimate, financial feasibility analysis, project recommendation, funding, and site selection and land acquisition (Bennett 2003).

The planning stage usually involves considerable back-and-forth deliberation of several alternatives, modified and refined options, in an attempt to find the 'best' solution to the stated programme objectives. Feedback is an important part of this process, as the various parties evaluate the alternatives, suggest changes and reach tentative decisions. Hence, this stage is considered critical in the identification, recognition, evaluation, and formulation of the innovation goal and objective, and the integration of important and influential stakeholders is necessary (Thomson & Munns 2010).

This stage is followed by the preparation of the design and specifications. It starts with a schematic design consisting of preliminary drawings and a written report developed by the design professionals, special consultants and engineers. A cost estimate is prepared as a part of the schematic design effort. Then the design is developed further with more details and specifications and a more refined cost estimate is produced. After design development, the technical design is prepared to coordinate the different components and elements of the project and information for statutory standards and construction safety.

During this final stage of the design phase, all of the previous effort is transformed into documents that will form the basis for the construction contract. When this stage is completed, the contractors can be selected, after which the work involved in procuring and assembling the physical parts can begin.

3. Pre-construction phase:

The first step in this phase is the preparation of detailed production information that will enable tender(s) to be obtained. Design professionals prepare not only the detailed construction drawings but also written contract conditions containing legal requirements, technical specifications stipulating the materials and the manner in which they shall be installed and a set of other documents related to the process of selecting the contractor and finalising the contract with the successful tenderer (RIBA 2013).

Then, the potential contractors including necessary specialist contractors are identified for the project. Tenders are then obtained and evaluated, based on these assessments recommendations are then submitted to the client.

4. Construction phase:

This phase is also referred to as the project mobilization phase. Here the contractor is appointed and issued information and arrangements are made to hand over the site to the contractor. Prior to this, various bonds, licenses and insurances should be secured and a detailed programme for the construction activities must be prepared. A project budget is developed and the system for tracking actual project costs is established. Then, the worksite has to be organised, with provisions for temporary buildings and services, access and delivery, storage areas and site security. The process of obtaining materials and equipment to be incorporated into the project must be initiated and arrangements for labour, the other essential resource, must be organised. After all of these activities, the actual field construction begins (Bennett 2003).

5. Operations and completion phase

The stage where contractors monitor and control, manage resources, work on documentation and communication. In monitoring and controlling, actual schedule progress is compared against the project programme to determine whether the project is on schedule. Likewise, the cost status is checked to establish how actual performance compares with the budget. An equally important part of monitoring and control is quality management, to assure that the work complies with the technical requirements set forth in the contract documents. T he contractor has an important role to play in managing the work safely and in a manner that minimizes adverse environmental impacts. Typically, the contractor assigns and supervises personnel and assures that the labour effort is sufficiently productive to meet schedule, cost and quality goals. This requires managing materials and plant so that the project goals are met. All of this is done while the contractor makes sure that everything is documented and communicated effectively among the team members (Bennett 2003).

6. Project closeout and termination phase

At the end of the project, a number of special activities must take place before the contractor's responsibilities can be considered complete such as the final clean-up, inspections and remedial work, closing the construction office and terminating the staff's employment. All of the required project documents should be finished, including approvals and certifications, a set of as-built drawings that represent all changes made to the original design, operating manuals, warranties and a final report. The contractor is also responsible for conducting a project critique and evaluation.

2.4 The innovation process

Murphy et al. (2011) argued that the innovation process elements established by Marquis (1968) is still viewed by many researchers as the seminal piece of work in defining the innovation process. They used Marquis (1968) six-stage innovation process in their construction specific study and supported their choice by different industry specific studies (e.g. Slaughter 2000; Tatum 1987; Winch 1998) that used the same approach. These stages are: recognition, idea formulation, problem solving, solution, development, and utilisation and diffusion.

After conducting a study using three case studies they linked generic procurement stages with the innovation process as follows,

- Stage1: Development of brief/intention to innovate.
- Stage2: Formulation of design/innovation conceptualisation.
- Stage3: Resolution of detailed design/innovation development.
- Stage4: Formulation of production information/manufacture of specification.
- Stage5: Mobilisation of the works/preparation to implement innovation.

- Stage6: Implementation of building design/implementation of innovation.
- Stage7: Completed building/commercialisation of the innovation.

Thomson and Munns (2010) have also attempted to map the innovation process with the construction project lifecycle through conducting a longitudinal case study approach using three cases. The study revealed that there are three decision gates in the process 1) decision to develop the concept; 2) decision to implement; and 3) decision to complete implementation. They also pointed out the innovation process experienced two levels of management control, one related directly to the internal function of the phase and the second related to the overall management of the innovation process and its integration needs with the project. The selection of an appropriate team emerged as a significant element.

The initial phase of the innovation process comprises the activities associated with gaining the authority required to progress the innovation from its conceptual form as an idea and a philosophy and evaluate it, formulate it, and develop it for practical application. Thomson and Munns (2010) argue that for preparing the project for the first decision gate, two activities should be undertaken, 1) assessments relating to the suitability, viability and the initial implications of the concept in practice, and 2) those activities relating to the presentation of the idea to the team and ensuring that a plan is established for an initial methodology for the process.

This first step is vital as the owner and the top management team has to sell the idea to the rest of the team (i.e. design team) and ask them to consider its suitability for the project. This phase should be aligned with writing the brief and the formulation of the design concept. Here arises the importance of stakeholder integration and the development of the right team members to support the innovation. In addition to that, this stage is critical in identifying how to measure the effectiveness of their innovation internally as the project progresses. Dialogue, conversation and knowledge sharing is important to clarify the objective of the innovation and to set clear goals for what is intended to be gained from the innovation (Slaughter 2000; Ozorhon 2014).

Following this phase, the formulation and development phase represents the process of transferring the concept from a philosophy into one that is developed and ready for implementation (Thomson and Munns 2010). Here arises the need to convince decision makers that the innovation has been developed sufficiently to enable it to be implemented. This is done through activities of assessment (feasibility, technical, financial, risk and impact assessments) and activities of planning (planning and development for implementation or practical application). Thomson and Munns (2010) stressed the importance of these activities to the success of the innovation process. They discussed that the thoroughness with which the respective idea champions assessed the overall suitability of the project and planned its implementation presented the rest of the project team (designers, contractors, and maintenance) with a clear case for its inclusion and a detailed understanding of its implications for their role within the project. The integration of team members and major stakeholders is further supported by a recent study undertaken by Ozorhon (2014).

In the implementation phase of the innovation process, the developed concept transforms into its practical function. In this phase, three major activities take place. There are activities relating to the structural planning and facilitation of the implementation process (an established methodology and programme, sufficient provision of resources and control, and structural facilitation measures); activities connected to the monitoring and feedback of the performance of the implementation process (gauging the difficulty in practice, feedback, improvement and evaluation meetings, and monitoring standards and quality during implementation); and activities associated with supporting the inclusion of all of the stakeholders within the process, notably integration of contractors and subcontractors, and catering for wider stakeholders (Thomson and Munns 2010).

Following the implementation phase, the final phase of the process is the handover phase. Performance is evaluated in this phase and the requirements for the future of the innovation are considered such as maintenance and operation and lessons for future consideration. According to Thomson and Munns (2010) this stage must consider two types of review process, one informal stemming from discussion amongst the team members about their experience and another formal exercise based on a post-evaluation meeting. The evidence shows that this phase plays a significant role in maximizing the transfer of knowledge and in facilitating learning amongst those involved, prior to the completion of the process. This is essential for team members to be able to transfer the lessons to future projects.

This innovation process should be based on criteria that measure the effectiveness of their innovation as the project is progressing to indicate the success of the innovation. According to Cooke-Davies (2002), performance predicts success and success factors affect performance. Takim & Akintoye (2002) added that an effective performance measurement strategy can indicate the degree of success of implementation of the innovation and consequently its effectiveness. However, the true nature of benefits from innovation may not be easily captured by traditional financial metrics alone and standards for measuring innovation effectiveness should therefore extend beyond financial measures (Sawang et al. 2007). The positive perception of the benefits of the innovation is necessary because programmes and projects implementing innovations are usually risky and uncertain. Perceiving the direct benefits of implementing the innovation in terms of the expenditures of money, time, and effort is necessary for future adoption of the innovation (Sawang et al. 2007; West 2001).

Sawang et al. 2007 argues that performance measurements in terms of outputs and resources should be measured at different levels. Outputs are measured to determine whether they help to accomplish objectives (effectiveness) and resources are measured to determine whether a minimum amount of resources is used in the production of outputs (efficiency). They add that in construction projects, there should be long-term relations with the various stakeholders in the project and the wider community for their project to remain competitive. Hence, performance measurement has to incorporate the interest of the stakeholders, both economically and morally.

Correspondingly, Rese and Baier (2012) studied two dimensions to measure the performance of their innovation project excluding the financial measures as their projects were under construction at the time of their data collection: the comparison of the original innovation project goals relative to the adherence to budget and schedule (efficiency), and the achievement of set goals and/or expectations, especially with respect to the quality of the outcome (effectiveness). This for instance concerns meeting technical targets, specifications regarding product quality, the client or user satisfaction desired, the rework that the innovation needs, and indications of future success.

This research is not concerned about measuring success factors or performance but rather the effect of stakeholder integration on the overall perception and progress of the innovation internally within the boundaries of the projects stakeholders while the project was still under construction. Therefore, it will follow a similar approach to that proposed by Sawang et al. (2007) and Rese and Baier (2012) by examining innovation effectiveness through studying the innovation outcome as the project is progressing and through the perception of the different stakeholders involved, which gives an indication about the success of the final outcome.

Going back to the lifecycle of the project and the innovation process, both studies undertaken by Murphy et al. (2011) and Thomson and Munns (2010) revealed a linear process closely aligned with the stages of the overall project lifecycle as shown in the following diagram.

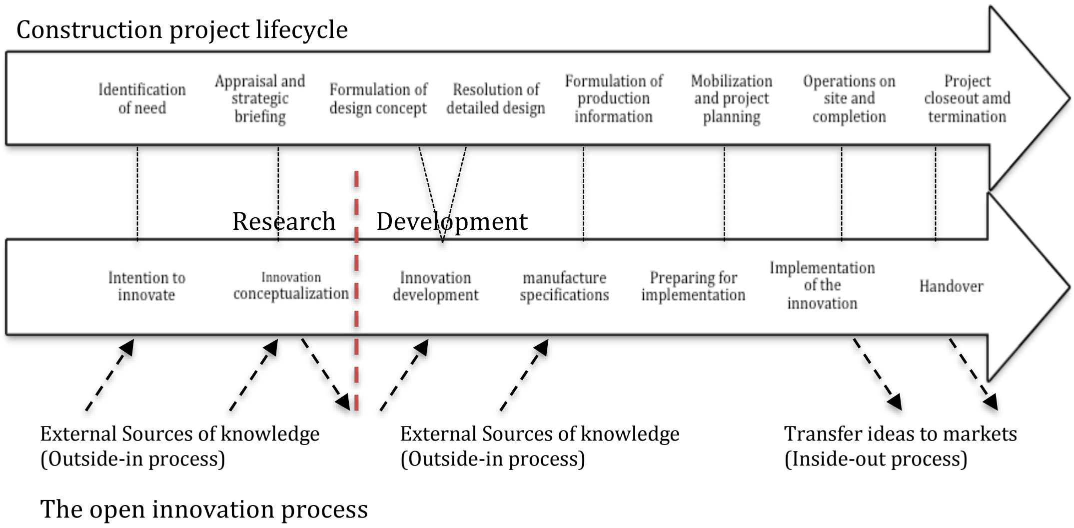


Figure 2-2: The aligned project lifecycle and the open innovation process

In this process, there must be an overall innovation leadership layer to oversee the phases of the innovation process by monitoring and providing both influence and feedback between the phases and between the innovation process and the wider project across its lifecycle (Ozorhon 2014; Thomson and Munns 2010). This is done through directing, guiding, and monitoring the overall innovation to ensure that the innovation is aligned with the overall strategic objectives of the project. This becomes more vital when dealing with open innovation. The notion of open innovation became famous after the contribution of Chesbrough (2003, 2006) who focuses on the possibilities and limitations for companies to move from a rather closed approach (where innovation is performed in-house, often in an isolated R&D department) to a more open approach, where innovation is done in collaboration and partnership with other companies and through the combined use of internal and external ideas. A range of scholars emphasize that external linkages are vital for companies to enhance their innovation (e.g. Huizingh 2011; Lichtenthaler 2011; West and Bogers 2014; Ozorhon

2014). This approach to innovation adds an external input to the innovation process and the overall project lifecycle, therefore, there is a necessity to integrate the external sources and stakeholders along with the primary stakeholders of the construction project especially at the initial and the design stage if the innovation is in the concept or the design of the project, and at the preconstruction and construction phases, if the innovation is in a product provided by the supplier or the contractor. Hall & Vredenburg (2003) discussed the ambiguous and complex impact of secondary stakeholders on the attempt to achieve innovations and stressed that it is of vital importance to consider them while initiating the innovation process. Hall & Vredenburg (2003) and Hart & Sharma (2004) argue that traditionally, innovation focuses only on a narrow range of stakeholders; thus, unexpected rejections and hindrances from the stakeholders that were ignored will be faced when attempting to deliver the innovation. They also emphasized that dealing with a wide range of important, yet invisible, stakeholders is crucial for successful innovation to occur. This creates a new level of complexity in dealing with the multiple and multidisciplinary stakeholders, and a need for coherent and robust integration and management strategies is evident (Ozorhon 2014). In addition to that, the decision of whether to go for open innovation and which part of the innovation process to open up requires a thorough understanding of the potential opportunities, challenges and risks of open innovation. Open innovation can be risky when other companies understand the basis of the internal core competence, which makes the project more vulnerable to competitors. Therefore, the changing boundaries of the innovation process and the process of creating and maintaining partnership relationships over time have to be properly managed in order to maximize potential value and decrease potential risks (Vanhaverbeke 2006; West & Bogers 2013). These issues further encourage us to look at the stakeholder theory and understand their different types, capabilities, and mechanisms to identify them, understand them, and integrate them for the sake of the innovation. The following section provides the theoretical background about stakeholders and their integration mechanisms.

2.5 Stakeholder integration and innovation

The review of the social network concept has shown that innovation requires the involvement of heterogeneous stakeholders. These can be suppliers, customers, universities, technology centers, trade unions, service providers, financial institutions, and many more, all engaged to achieve a specific outcome. The extent that stakeholders are integrated is important in open innovation in particular. Various scholars have evaluated integration as a strategic capability for the organization that leads to the development of other capabilities such as environmental protection (Sharma & Vredenburg 1998), organizational learning (Heugens et al. 2002), human resource management (Longo & Mura 2008), and innovation (Brown 2003).

According to Sharma and Vredenburg (1998) stakeholder integration is the ability to create positive collaborative relationships with and between a wide range of stakeholders. These collaborative relationships are the result of a number of factors: (1) knowledge of stakeholders and their needs (2) interaction between stakeholders and the organization, and (3) taking decisions which take into account stakeholders' demands. To understand how stakeholder integration achieves innovation, it is necessary to know the stakeholders' perspectives, attributes and interests, their dynamics, roles in innovation and ways that they can be managed and integrated. The following section elaborates on the theoretical background of stakeholders and discusses ways to measure their power and influence on projects. It will also present information about their networks and assesses how they influence innovation.

2.5.1 Stakeholders: A theoretical overview

One of the first significant attempts to define stakeholders was published in Edward Freeman's (1984) book titled, Strategic Management: A Stakeholder Approach when he produced a 'Stakeholder Model'. Figure 2-2 illustrates the stakeholder model which he defined as "individuals that can affect, or are affected by, the accomplishments of organizational purpose" (cited in Rowley 1997).

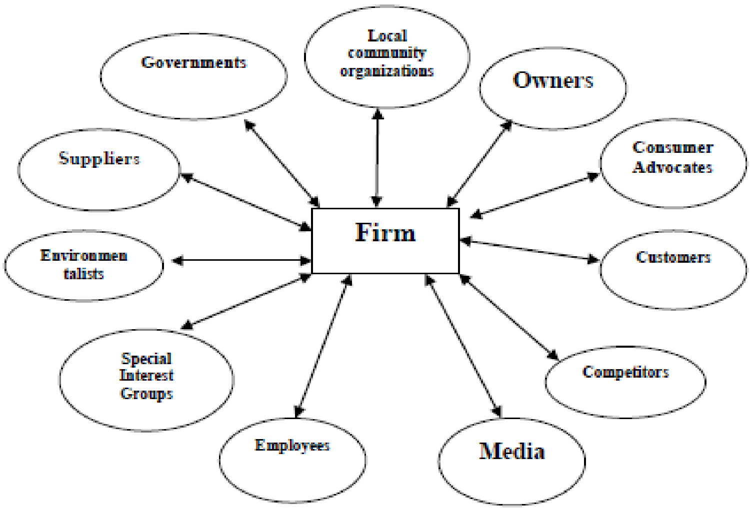


Figure 2-3: Stakeholder view of the firm. (Freeman 1984, p. 25).

Freeman (1984) claimed that stakeholders play a vital role in the success of the organization and notes the limitation of his stakeholder illustration, namely, it is very static and does not accurately reflect complex reality. He adds that different stakeholders have different influences that change throughout the project's life cycle. Moreover, in real life, interconnections can be found between stakeholders and it is often feasible to divide different actors into a variety of stakeholder categories and subcategories.

In 1995, Donaldson and Preston published a second major contribution titled, "The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications." The authors categorize the stakeholder theory into descriptive, instrumental or normative. The descriptive theory is used to describe the corporate characteristics and behaviours. This approach is important in innovation studies since it helps in realizing the differences between the organizations that have stake in an innovation such as consultants and developers and those that have stakes and interests in its application such as the adopters who will be affected by the innovation. Thus, with this approach the innovation communities are defined more coherently. However, this approach is very limited as it is crucial to also analyze and evaluate stakeholders and their motivations in innovation activities, which leads on to understanding the roles of the instrumental and normative aspects.

Using instrumental theory, the connections between stakeholder management and the achievement of corporate goals can be explored (Donaldson & Preston 1995). In the innovation context, this instrumental dimension represents managing the involvement of various stakeholders into the initiation and diffusion process thus resulting in accelerating the diffusion while addressing stakeholders needs at the same time. Donaldson and Preston (1995) argue the descriptive and instrumental approaches do not fully justify stakeholder theory. In order to address the ethical and moral issues, a normative theory should be considered. The normative aspect identifies moral guidelines for the management and operation of the corporation. In the innovation context, the interests of stakeholders in innovation are understood as having an intrinsic value, which is a central idea of any normative theory. Since social performance and responsibility is a priority, innovation should benefit society as a whole and not only a specific group of involved stakeholders (Ruf et al. 2001). When dealing with complex networks of stakeholders, data can flow through many unprecedented and perhaps unforeseen paths thus affecting stakeholders that have not been considered or identified (Smith & Hasnas 1999). Consequently, the integration of stakeholders and the development of their social networks have a broad ethical and normative implication that should be considered.

Many other scholars have also attempted to understand stakeholders more thoroughly and have introduced new ideas and frameworks on how to manage and eventually integrate them in the organization. Savage and Nix (1991) emphasized, for example, the importance of stakeholders in the business environment. According to their knowledge about their surroundings and organizations, in addition to their interdependence, it is necessary to categorize them into primary and secondary stakeholders. The ones that are bound to the organization through a contract are classified as the primary stakeholders whereas the secondary stakeholders are the ones who are influenced or can influence the outcomes of the project without a contract. Savage and Nix (1991) also advocated identifying stakeholders that have the power to threaten the project as well as those who can coordinate and develop appropriate strategies in order to change or further encourage relationships for the sake of the project's success.

Stakeholder influence is of primary importance when dealing with the innovation context. For the innovation champion or organization to be able to integrate stakeholders and get their approval about the innovation, a thorough understanding of who they are and the accurate identification of the major and secondary ones is crucial to avoid future uncertainties. According to Freeman (1984), the first step in stakeholder management is to define who they are. Applying his definition of stakeholders, it means that organizations should identify the groups that can affect or be affected by the achievement of the organization's purpose. Freeman recommends mapping stakeholders and providing a detailed list of the stakeholders and a corresponding detailed list of their interests.

Many scholars have criticized dependency upon an existing list for mapping primary and secondary stakeholders. Ackermann and Eden (2011) argued that organizations ought to identify who the real stakeholders are in their projects rather than merely depending on a generic list of stakeholders. The assumption here is that it is crucial to recognize the uniqueness of the context and goals of a particular project or organization and identify 'specific' stakeholders accordingly. In the construction field, Awakul & Ogunlana (2002) identified five groups of stakeholders: the groups affected by the projects, the participants of the project, non-governmental and interested organizations, academics and experts, and the local government officials. Then, it is according to the context and goals of the organization or project that the specific stakeholders are considered and the ones who are thought to be important can then be identified. This provides a clearer image of the overall process of stakeholder identification in construction projects.

2.5.2 Stakeholder networks and innovation

Scholars such as Cleland (1986); Jergeas et al (2000); Aaltonen et al. (2008); and Olander & Landin (2008) have argued in favour of the importance of successful relationship management amongst stakeholders to achieve successful projects. They provided normative and descriptive theories on the importance of actively promoting the relationship between different stakeholders. Their argument elaborates on the idea of considering relationships between stakeholders as a network rather than merely as a set of static and linear linkages. This is crucial in many construction projects that have very complex, nonlinear and interactive environments. This is because construction projects rely on collaboration and coordination of the various stakeholders within and outside the supply chain. The demands, interest, power, and influence of stakeholders vary and these phenomena are important for projects to be successful and innovative. Figure 2-3 illustrates a stakeholder relationship structure

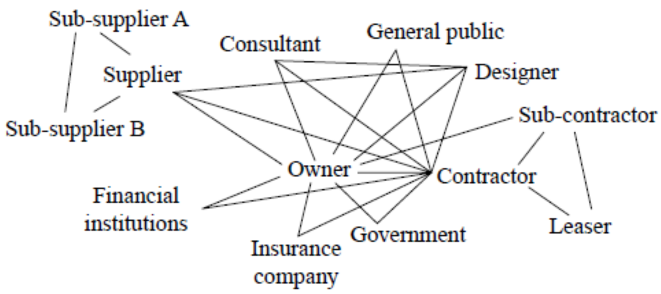


Figure 2-4: Project stakeholders' relationship structure (Yang et al. 2009).

derived from a study completed by Yang et al. (2009).

Unlike Freeman's model of dyadic network relationships, the links between stakeholders in this diagram are broader based on Social Network Theory (SNT), and do not solely represent focal stakeholders but also the connections with secondary stakeholders. Moreover, it illustrates that the owner or the manager of the project might not be the focal point of other stakeholders, but rather, some stakeholders can be focal points to others according to their respective social systems. This means that the power of different stakeholders varies in the project according to the influence they have on other stakeholders.

It is also essential to consider the 'invisible stakeholders' as Bourne & Walker (2006) have highlighted. Their importance stems from the fact that they might appear to have little influence but their hidden power in affecting the major stakeholders might still be significant. Olander & Landin (2008) mention the 'public' as an example of the invisible stakeholders in construction projects due to their periodic significant influence. In the context of innovation, there are two principal theoretical models in which network relationships impact on innovation, the relational and structural models (Valente 1995). With the relational model, the relationship with influential leaders or innovation champions is highlighted in the context of studying the adoption behaviour of the main stakeholder. On the other hand, the structural model focuses on all of the relationship patterns that the main stakeholder may have in its network including their position.

Scholars who focus on structural networks claim that there are two characteristics that determine the behaviour of stakeholders in adopting an innovation: network density and centrality (Rowley 1997; Nambisan & Agarwal 1998). Network density measures the pattern of intense interconnectivity demonstrating the ties that are established between many nodes of the network (Rowley 1997). Galaskiewicz and Wasserman (1989) argue that as the interconnections within the network get denser, innovation expectations are likely to increase and diffusion is more likely to be facilitated. In contrast, centralized networks represent fewer active ties between the nodes as it refers to formal power in the network relative to others (Burkhardt & Brass 1990). If the innovation champion is in a central position in the network, then there will tend to be many connections with other stakeholders and the champion will occupy a strategic position in the overall structure of the network. In this condition, the major stakeholder has control over resources or information, making it more capable of influencing the adoption behaviour of other members in the network (Liu et al., 2005). Valente (1995) supports the idea that centrality has a positive empirical relationship with innovativeness.

Along with centrality comes the notion of stakeholder salience in the network relative to others. Mitchell et al. (1997) presented a "power, legitimacy and urgency" grid to demonstrate the influence of stakeholders on the organization's activities. Power is "the capability of stakeholders to let another stakeholder do something" which is comparable to the notion of centrality (Yang et al. 2009, pp. 167). Legitimacy is "the acceptability of the stakeholder behaviours in terms of social ethics and laws" (Yang et al. 2009, pp.167). Legitimacy constitutes a negotiated normative dimension of the desirable social good. It is crucial to distinguish between power and legitimacy as legitimate stakeholders are not necessary powerful ones (Mitchell et al. 1997). Urgency is "the degree to which stakeholder claims call for immediate attention" (Yang et al. 2009, pp.167). The importance of knowing urgent stakeholders lies in the notion of capturing the dynamics of their interactions. As organizations possess one or more combinations of the attributes discussed above, different levels of salience are presented, thus their influence on innovation is varied as well.

Stakeholders that possess all attributes are referred to as 'definitive stakeholders' and they have the most positive or negative influence on innovation. In contrast, stakeholders who have no power, legitimacy nor urgency have no salience and are referred to as 'non-stakeholders' as they are not able to influence the innovation. Low

salience stakeholders possess one attribute only and are referred to as 'latent stakeholders'. They also have little or no impact on innovation; for example, a stakeholder with power such as a 'dormant stakeholder' will not be able to influence the innovation without legitimacy or urgency. Likewise, a stakeholder with legitimacy, a 'discretionary stakeholder' with no power or urgency, will not be able to apply serious pressure on the innovation. Latent stakeholders can acquire more salience and become 'expectant stakeholders'; in this case, their influence on innovation in the network can increase to a moderate level. For instance, a powerful and legitimate stakeholder, a 'dominant stakeholder', has a good chance of influencing innovation; however, due to the lack of urgency the influence might not be immediate enough causing delays (Troshani & Doolin 2007; Mitchell et al. 1997).
Understanding stakeholder types, networks, their power, urgency, and legitimacy is crucial to know how to deal with them and to know whom to prioritize and at what point in the project lifecycle and in the innovation process. It is a worthwhile management technique of strategic analysis that can inform and facilitate stakeholder collaboration and coordination for the sake of the project's goal.

2.5.3 Stakeholder coordination and collaboration

As mentioned in previous sections, the construction project includes several common interdependences between different professionals, processes and tools that need to be managed concurrently, thus they require coordination through the continuous adjustment of plans throughout the project (Lavikka et al. 2015).

Coordination is defined as the integration of an organization's different parts towards the achievement of a common goal (Lavikka et al. 2015). It is essential to specify stakeholders' rights and responsibilities for successful collaborative work in construction projects to occur (Pilbeam et al. 2012; Wong et al. 2008). Throughout the construction supply chain, information has to be coordinated and shared so that stakeholders' knowledge resources contribute to integrated processes of innovation (Xie et al. 2010; Huang et al. 2014).

One type of coordination in construction project is performed through contracts. Contractual coordination is one way to manage the coordination needs of collaborative work. In the "design-build" contract where one company is responsible for both the design and the construction phases, coordination is easily managed, on the other hand, the traditional dyadic "design-bid-build" contract, where the owner makes separate contracts for the design and the construction phases, are not enough to coordinate the collaborative work between multiple construction project stakeholders especially when the projects are complex and include innovation (Bygballe et al. 2010; Lavikka et al. 2015). Dyadic contracts limit collaboration and innovation and lead to an inability to coordinate (Matthews & Howell 2005).

As a result, multi-party contracts have been offered as a solution to coordinate construction stakeholders' collaborative work in complex construction projects. In a multi-party contract, risks and rewards are shared at least between the owner, the designers and the contractor. A multi-party contract specifies mechanisms for information exchange between the parties. However, the mechanisms need to be implemented after contract negotiations to ensure the effective coordination of collaborative work (Kent & Becerik-Gerber 2010; Heidemann & Gehbauer, 2011).

Procedural coordination aims at coordinating collaborative work between stakeholders after the contract is signed. At this stage, team member selection and the “building of a cohesive project team” to ensure the team has a shared goal is necessary (Love et al., 2004, p. 48). Likewise, it is essential to build trust between the parties of the team and coordinating the parties’ collaborative work. For an effective degree of procedural coordination, efficient information flow and learning are necessary. These can be realized through technological mechanisms employed in day-to-day interactions between project stakeholders (Lavikka et al. 2015).

Generally, efficient procedural coordination of the flow of information between stakeholders is easy to achieve using information technology systems, such as project management software (Lönngren et al., 2010; Cheng et al., 2014). Another procedural coordination mechanism is building information modeling (BIM), which also enables efficient information flow between project stakeholders (Eastman et al., 2011; Bryde et al., 2013). Hampson and Brandon (2004) argue that BIM is a catalyst for significant transformation composed to reduce industry fragmentation and improve its efficiency and effectiveness. They further claim that since BIM collates processes and disseminates information to key stakeholders, it provides considerable advantages as an efficient means of producing fully coordinated production information, which enhances stakeholder collaboration and engagement. Gilligan and Kunz (2007) conducted a survey to determine the value of BIM to project stakeholders. Their key findings indicate that the use of BIM lowers the overall risk for stakeholders distributed across the project and leads to better engagement of project staff and reduced contingencies. Another important procedural coordination mechanism is defining common goals as it enhances stakeholders’ collaborative work by developing trust and encouraging information sharing (Khalfan et al. 2007; Sebastian 2011).

The sharing and usage of knowledge between stakeholders does not happen automatically but rather, requires facilitating knowledge sharing and usage across expertise and organizational boundaries (Lawson et al. 2009). One of the procedural mechanisms that help in sharing knowledge is co-location of the project parties (Xie et al., 2010; Lavikka et al. 2015). This mechanism enhances the sharing of tacit knowledge and enables problem-solving (Wagner 2003) as it is easy to form social networks when people work near to each other.

Lean construction is another way of coordinating the different stakeholders. It originates from lean thinking and was brought into the construction industry to achieve streamlined processes and reduce throughput times with less costs and higher quality. The most important core element of lean construction is waste reduction (Eriksson 2010). This is primarily achieved through efficient transportation and stockholding of material, off-site manufacturing, and information technology in the form of 3D modelling, which allow detection and correction of most errors prior to production. These joint IT tools enhance integration among supply chain actors and their tasks and increase the chance of cost and schedule success (Eriksson 2010).

Another core element of lean construction is end customer focus (Jorgensen & Emmitt 2009). Contractors and suppliers must understand the needs of the customer so that they can supply the customer with what he/she needs. In order to increase end customer focus, it is important to adopt lean principles already in the design stage (Eriksson 2010). Early involvement of contractors and integration of design and construction in concurrent engineering are an important aspect of lean construction (Winch 2006; Mao & Zhang 2008; Jorgensen & Emmitt 2009). Concurrent engineering increases the contractors' understanding of customers' needs and improves teamwork and joint problem-solving, resulting in significant time savings (Eriksson 2010).

Cooperative relationships among stakeholders and facilitating the integration of different actors' competences and efforts in joint problem-solving are important elements of lean construction (Green & May 2005; Jorgensen & Emmitt 2008). According to Eriksson (2010), traditional procurement approaches are often criticized for producing waste, long lead times, and adversarial relationships; therefore, they need to be transformed into a lean contracting approach. Achieving harmonization between main contractors and subcontractors is important for lean construction since subcontracting can account for most of the project value and because project activities are totally interrelated (Miller et al. 2002). Essential to the establishment of a cohesive team, it is necessary that all parties benefit from improved performance resulting from the implementation of lean construction (Green & May 2005). Fair and equitable rewards are important for building trust and cooperation among construction supply chain actors (Khalfan et al. 2007).

Herazo and Lizarralde (2015) argue that the recent adoption of green building certifications (GBCs) has significantly influenced the construction industry and the processes of collaboration and innovation. Like other environmental assessment methods, they assist in creating awareness among stakeholders and users and have become a powerful way to show stakeholders' commitment to sustainable development.

Building Research Establishment Environmental Assessment Methodology (BREEAM), which was implemented in the UK in the 1990's, is one of the first commonly used building assessment methods. Since then, other methods and tools have been developed, focusing on particular contexts of energy use and building sector interests. They include, for example, Haute Qualité Environnementale (HQE) in France, Comprehensive Assessment System for Built Environment Efficiency (CASBEE) in Japan, Green Star in Australia and LEED in the US and Canada (Herazo and Lizarralde 2015). Despite this diversity, the programme Leadership in Energy and Environmental Design (LEED), created in 1998 by the United States Green Building Council (USGBC), is probably the most popular method and tool in the world: there are more than 52,000 LEED certified buildings around the world (US Green Building Council Research Committee 2008).

Herazo and Lizarralde (2015) conducted 19 interviews with people from three architecture projects conducted in Canada that received a widely popular GBC and were significantly influenced by sustainable development principles during the design and building process. Their research revealed that leadership was by far the most influential factor in the tensions found. The leader plays a specific role in terms of smoothing tensions, particularly those originating in between the strategic and tactical levels and between individual and collective approaches to risk, innovation and design. Their role includes not only obtaining the points needed for GBC, but also generating a collaborative and innovative environment. They also revealed that the documentation procedures to formalize and standardize sustainable practices and GBCs could hinder innovative initiatives, as the different stakeholders perceive the tools used to achieve sustainable development differently. Some stakeholders see them as extra work with supplementary fees that, together, increase tensions.

Understanding these different stakeholder dynamics is crucial for proposing advanced management techniques for the sake of advancing innovation processes and outcomes. We should not view the relationship between stakeholder integration and innovation effectiveness as a static and linear relation but rather a dynamic one. Stakeholder integration usually requires a leader that facilitates it and an innovation team that work alongside the different stakeholders to facilitate the process of implementing the innovation. Hence, leadership and the innovation team cannot be ignored in studying the influence of stakeholders as they can directly influence or be influenced by the nature and degree of integration.

The following section discusses leadership for innovation followed by a section that discusses the dynamics of the innovation team, their psychology, motives and motivators. It also relates the concepts of leadership and team identity with open innovation and stakeholder integration to draw out the full picture of the dynamics that take place in projects for the purpose of achieving effective innovation.

2.6 Leadership for innovation

2.6.1 Leadership: an overview

The essence of leadership in projects is influencing and facilitating individuals and teams to accomplish shared goals (Yukl 2012). Leaders are able to improve the performance of a team by influencing the processes that determine performance. Much of leadership research paid attention to identifying aspects of behaviour that explain leader influence on the performance of a team or an organization. Therefore, many researchers developed observable, distinct, measurable, and relevant leadership categories for many types of leaders.

Leadership behaviours that are concerned with encouraging and facilitating change received little attention in the early leadership research. However, with the emergence of more dynamic and uncertain environments, the study of leader change behaviour has become so common in recent decades (Yukl 2012).

Recently, leadership and innovation has gained increasing attention in the literature (Yukl 2012; Ozorhon 2010; Aronson et al. 2013; Ozorhon et al. 2014). As discussed in section 2.2.3.3 leadership is one of the most influential factors that affect innovation in organizations and projects. This section examines in-depth the relationships between leadership and innovation. Leadership reflects the goal-directed influence that one person has over other members in an organization or a group in guiding, structuring, and facilitating relationships and activities. Thus, the role of the leader is key for the organization/project to function in an effective and innovative manner (Nam & Tatum 1997). It is the leader's role to contribute actively to the introduction of new ideas, goals and innovations in an organization/project, therefore, leadership style is considered a crucial attribute in influencing innovation (Aronson et al. 2013; Ozorhon et al. 2014; Bossink 2004).

2.6.2 Leadership and innovation

Creating the conditions that facilitate, motivate and sustain innovation is one of the greatest challenges facing leaders (Yukl 2010). Transformational leadership (Jung et al. 2003), innovation championing (Howell and Higgins, 1990) and leader-member exchange (Graen & Uhl-Bien 1995) have been found to have a positive influence on innovation.

Many researchers have linked transformational leadership to innovation such as

Howell and Avolio (1993) and Jung et al. (2003). According to Jung et al. (2003) this leadership style is the preferred style to enhance innovation. Transformational leadership introduces creativity and innovation by actively engaging followers and stakeholders. It links their identities to the collective identity of their organizations, thus raising their intrinsic motivation rather than just providing them with extrinsic motivation to perform their tasks. Through the development of important vision and mission, transformational leaders heighten the followers' understanding of the value of the desired outcome, thus raising their performance and their willingness to exceed their self-interests for the sake of the organization (Howell & Avolio 1993). This type of leadership also promotes collaboration by stimulating collective goals, building trust, empowering people, developing competence and offering visible support (Jung et al. 2003). Some survey instruments that present the factors of transformational leadership are: Multifactor Leadership Questionnaire (MLQ, Bass & Avolio, 1994) and Leadership Profile Inventory (LPI, Kouzes & Posner, 1995). The factors and descriptions of these measurements of transformational leadership are presented in Table 2-2 and Table 2-3 respectively.

Table 2-2: Transformational leadership in MLQ (Bass & Avolio 1994)

Factors	Description
Idealized influence	Admired, respected, and trusted leaders. Followers' needs are more important than his/her own needs. The leader shares risks with followers and is consistent in conduct with underlying ethics, principles, and values.
Inspirational motivation	Leaders motivate followers by providing meaning and challenge to their work. The leader encourages followers to envision attractive future states.
Intellectual stimulation	Leaders question assumptions, reframe problems and bring new ways in approaching old situations therefore stimulating their followers' effort to be innovative and creative. Followers are included in problem solving processes and their new ideas and creative solutions are encouraged and welcomed.

Individualized consideration	Leaders act as a mentor and pay attention to each individual's need for achievement and growth. A supportive climate is provided to create new learning opportunities. Individual differences in terms of needs and desires are recognized.

Table 2-3: Transformational leadership in LPI (Kouzes & Posner 1995)

Factors	Description
Challenging the process	Leaders explore challenging opportunities to change, grow, innovate and improve. They experiment, take risks, and learn from mistakes.
Inspiring a shared vision	Leaders envision an improved future. They enroll others in a common vision that is appealing to their values and interests.
Enabling others to act	Leaders foster collaboration through building trust and sharing cooperative goals. They also strengthen people by giving power away, providing choice, developing competence, assigning critical tasks, and offering visible support.
Modelling the way	Leaders behave in ways that are consistent with shared values and therefore they set examples to their followers. They also achieve small wins that encourage a coherent progress and build commitment.
Encouraging the heart	Leaders recognize individual contributions to the success of every project, and celebrate team accomplishments regularly.

It is argued that since innovation is usually associated with change; therefore, leadership styles that can accommodate change are correlated with innovation (Dackert et al. 2004; Scott & Bruce 1994; Tierney & Farmer 2004). These leadership styles are defined in the literature as *change-oriented leadership* and leader-member exchange. Change-oriented leadership is considered as a form of transformational leadership (Gil et al. 2005).

Change-oriented leadership, as explained by Yukl (2012) includes certain behaviours that facilitate innovation, collective learning and adaptation to external changes, these behaviours include advocating change, envisioning change, encouraging innovation, and facilitating collective learning. The first two behaviours reflect leader encouragement and initiation of change and the second two highlight leader facilitation of change processes.

Yukl (1999) cautions that transformational leadership can overlook the influence of the leader on the team or the organization due to its focus on dyadic processes. In addition to that, there is not much detail given in previous research about the causal effects of the transformational leader's behaviours on organizational processes. Leader-member exchange style makes the assumption that innovativeness has a direct relationship on the relationship between the leader and followers (Scott & Bruce 1994). This style of leadership relies on the effectiveness of developing mature partnerships based on trust and support and leads employees and stakeholders to take risks and deviate from the status quo (Scott & Bruce 1994). The LMX7 is a survey instrument frequently used to study the level of leader-member exchange (Graen & Uhl-Bien 1995).

The final important leadership style is championing behaviour. Rogers (2003) claims that a leader with an innovation champion personality have a direct influence on innovation diffusion. The presence of an innovation champion has been widely related to the success of innovations (Howell & Higgins 1990; Howell & Shea 2001; Nam & Tatum 1997). Champions have the power to affect the internal distribution of power and resources, strategic actions, and performance either positively or negatively. In addition, they can determine some internal organizational consequences such as the speed and position of career progression and the motivation or retention of members. On the cross-functional level, champions can promote communication between stakeholders and facilitate effective decisions about innovation projects (Howell & Shea 2001). Howell and Shea (2001) developed a 'championing behaviour scale' to list some specific behaviours of a champion as presented in Table 2-4.

Table 2-4: Championing behaviour scale (Howell & Shea 2001)

Factors	Description
Demonstrates conviction in the innovation	• Expresses confidence in what the innovation can do • Points out reasons why the innovation will succeed • Enthusiastically promotes the innovation' s advantages • Expresses strong conviction about the innovation • Keeps pushing enthusiastically for the innovation • Shows optimism about the success of the innovation
Builds involvement and support	• Gets the key decision makers involved • Secures the top level support required • Gets problems into the hands of those who can solve them • Gets the right people involved in the innovation • Makes improvements based on feedback received
Persists under adversity	• Persists in the face of adversity • Does not give up when others say it cannot be done • Sticks with it • Knocks down barriers to the innovation • Shows tenacity in overcoming obstacles

These various leadership characteristics have the potential to influence the integration of stakeholders and the management of the innovation team to achieve the ultimate goal of innovation.

2.7 Innovation team identity

2.7.1 Identity: an overview

A number of authors have stated that the use of the identity concept in the social science literature has a long history and an active present (Brubaker & Cooper 2000; Gleason 1983). Gleason (1983) conceptually developed the concept of identity to be used in psychology, sociology, and related disciplines. Since Gleason's analysis, the concepts of identity have continued to diffuse across academia. In the social psychology field, Tajfel's (1978, 1981) social identity theory and self-categorization theory (Turner et al.1987) have become fundamental in the social sciences. In the sociology field, identity has become central in the theories of Stryker (1987), Burke (1980), and McCall and Simmons (1978). The concept has become a focal point in discussions on Anthropology and cultural studies (Eriksen 2001; Holland 1997) as well as contemporary academic discussions.

The range of interest in the concept of identity reflects its importance and relevance. Therefore, more researchers considered it as a fertile ground for research.

2.7.2 Team identity and innovation

Unlike closed innovation at the organizational level, where the norms, roles, tasks of members are defined by the corporate law, corporate governance and the formal organizational structure (Child 1972); open innovation at the project level defines the tasks and roles of members through informal rules that the team adopts to regulate team members' behaviour (Rese & Baier 2012). In this case, the norms that define team members' behaviour are highly dependent on the interactions among them and are related to the group's identity (Postmes & Spears 2000).

2.7.2.1 Team identity at group level

Rese and Baier (2012) argue that it is vital for the innovation team members to develop a specific self-concept as a team, which reflects the identity of that team. Here arises a significant role for the management and the stakeholder integration to enhance this behaviour in different ways. The role of management in building innovative teams is significant since it must create and/or assure suitable conditions for the stakeholders and the team members to be interested in the innovation. This can be challenging in an open innovation context due to the ownership of the project. The complex nature of open innovation in construction can cause teams to be distracted and become dispersed in their efforts across addressing the many demands of different stakeholders. Therefore, maintaining a strong identity and sense of belonging within the innovation team is considered vital. The innovation management team is a key player in this situation holding major responsibility for creating and maintaining identity and membership within the team. At the same time, attainment of successful stakeholder integration plays a key role in defining the innovation goal and reducing the uncertainties and ambiguities that are associated with fragmented stakeholders.

Social identity theory developed by Tajfel and Turner (1979) has provided an explanation of the formation of the concept of team identity. They claim that group identity is the feeling of belonging of individuals to certain groups that create some emotional and value significance for them and a sense of membership. Team identity develops when team members interact with each other. Rese and Baier (2012) encourage the close communication of the project's team members to achieve a common understanding of the innovation project. Interacting behaviours of the team members are either presented in tasks or in socio-emotional behaviours.

The membership of a specific team is determined by group boundaries. Boundary issues are important in construction projects as the team members are assigned from different organizations and at any one time they interact with different groups and stakeholders, hence, the boundary of the project team cut across formal boundaries of different organizations. Being aware of the goal of the innovation and having a clear definition of the goal places them at risk of having a conflict of interest with the goals of their employing organization and they might face significant opposition in this situation which leads to substantial conflicts. Thus, shedding light on how to manage team identity and group boundaries in favour of the innovation project is very crucial (Rese & Baier 2012). Friedlander (1987) identifies some dimensions that affect the quality of group boundaries: boundary clarity and permeability, the degree of cohesion between group members, the degree of match between group members' functional identity and local language, and the climate within the team (in Rese & Baier 2012).

Boundary clarity is the degree to which the innovation team is independent on other teams (Rese & Baier 2012). Teams that work on projects are less structured than organizational teams, thus, they need to deal with more uncertainty and ambiguity necessitating additional clarity. This assists in strengthening team membership and increasing members' commitment to the common goal. Boundary permeability deals with information flow and the circumstances that can hinder or facilitate the inward and outward flow of communication (Alderfer & Smith 1982; Agazarian 1989). Ellemers et al. (1988) claim that the more permeable the boundary is, the stronger identity the team can have. Cohesion is another important dimension that can affect the identity of the team. According to Festinger et al. (1950), cohesion is the desire of the innovation team members to remain in the team and to commit energy and resources to the common innovation project. This element is very important and is very much related to the other element discussed by (Friedlander 1987 in Rese & Baier 2012) which is the development of a common understanding by pursuing common goals and tasks, which results in facilitating team identity and membership.

The last element that increases membership of the team members and consequently strengthens their identity in the innovation project is the shared perceptions of the team's policies, practices, and procedures (Reichers & Schneider 1990) promoting innovation, cooperation, and mutual support (Friedlander 1987). These elements have been empirically demonstrated to increase innovation project performance (Rese & Baier 2012).

2.7.2.2 Team identity at individual level

Ashmore et al. (2004) contemplated team identity differently. These authors reflect on team identity by using the term 'collective identity' which is "identity that is shared with a group of others who have (or are believed to have) some characteristic(s) in common" (Ashmore et al. 2004, p. 81). Members of a group can share characteristics such as ethnicity or gender, or achieved states, such as occupation or political party. People might have direct contact or interchange with all others who share these characteristics and state or only position themselves psychologically under that category. Ashmore et al. (2004) argued that the concept needs to be better articulated by viewing it as a multidimensional concept. Consequently, Ashmore et al. identified the distinct individual-level elements of identity that can influence collective identity. These elements are self-categorization, evaluation, importance, attachment and sense of interdependence, social embeddedness, behavioural involvement, and content and meaning.

Self-categorization is recognized as the soul of collective identity. It is a precondition for all of the other dimensions of collective identity. Deaux (1996 in Ashmore et al. 2004, p. 84) defined it as "identifying self as a member of, or categorizing self in terms of, a particular social grouping." The process is assumed to happen automatically as soon as people are organised in groups of meaningful categories because humans have a cognitive tendency to sort themselves into social categories on the basis of their similarity with or distinctiveness from other social groups (Ashmore et al. 2004). However, self-categorization is not always as simple as suggested by studies because a person can choose to categorize self in any given situation or not, and these choices may depend on different goals and motives (Nagel 1996; Phinney 1996). Therefore, for a proper measure of self-categorization Ashmore et al. (2004) pointed out that open-ended questions in regard to group membership is necessary to confirm that the person of interest is answering any additional questions in reference to the "correct" social category.

Evaluation is the simplest form of identity, which refers to "the positive or negative attitude that a person has toward the social category in question (Ashmore et al. 2004)." The concept is independent of importance in that it is the potential for a person to consider an identity positive without that identity necessarily being very salient. Evaluation can be a private regard and a public regard according to Sellers et al. (1998). Private regard evaluation is measured by considering words such as *glad*, *happy*, *proud*, and *satisfied*. Whereas, public regard evaluation is when the respondent uses the term *in general* to talk about a specific group.

The importance of being within a particular group, can vary in degree, from low to high, according to the respondent's self-concept. According to Stryker & Serpe (1994), centrality and salience are the two key attributes that influence the degree of importance. Centrality is the evaluation by the individual of how essential a social category is to one's overall self-concept whereas, salience is the strength of membership to one group compared to membership of other groups (Stryker & Serpe

1994). Therefore, a central and salient membership of a group will hold a high degree of importance.

Attachment and sense of interdependence is “the affective involvement a person feels with a social category or the degree to which the fate of the group is perceived as overlapping with one’s personal fate (Ashmore et al. 2004, p. 90).” It can be derived from three components, the first is the sense of interdependence, which is the awareness of belonging to a specific group and the shared fate with this group (Gurin & Townsend 1986), the second is the sense of attachment and affective commitment, which incorporates a sense of emotional involvement with the group or affective orientation toward the group (Abrams et al. 1998), and the third component is the sense of interconnection between self and others, which involves the merging of the self and a group (Tyler & Blader 2001). Interdependence, affective commitment, and interconnection form the basis of attachment to a group.

Social Embeddedness is “the degree to which a particular collective identity is implicated in the person’s everyday ongoing social relationships” (Ashmore et al. 2004, p. 92). It is considered to be high when most of the person’s everyday social connections involve people in a particular social category and it would be costly to abandon that particular collective identity. Behavioural Involvement is “the degree to which a person engages in actions that directly implicate the collective identity category in question (Ashmore et al. 2004, p 92). Behavioural involvement is an expression of a particular identity of interest that is important for gaining access and membership in that group.

Content and Meaning on the other hand, is related to the semantic space in which an identity resides which can include self-attributed characteristics, political ideology, and developmental narratives (Ashmore et al. 2004). This dimension consists of three components: self-attributed characteristics, ideology, and narrative. These components are hard to measure as they can vary extensively among individuals. Therefore, studies on these factors have been mainly qualitative in nature.

Contrary to team identity at a group level, individual level team identity has not been studied in the context of innovation in construction. It is important to study both components of team identity since they relate to each other. As mentioned above, Tajfel and Turner (1979) explained group identity as the feeling of belonging of individuals to certain groups that create some emotional and value significance for them and a sense of membership. Ashmore et al (2004) identified the distinct individual-level elements of identity that can influence collective identity. These elements have a direct affect on the sense of membership of a specific group, consequently, it has an affect on group level identity. This relationship cannot be ignored if the researcher desires to gain a holistic understanding of team identity. Therefore, this research will be one of the first studies to consider both angles on team identity in a construction innovation context.

2.8 Research Problem

This chapter provided a critical and comprehensive review of the literature concerning innovation and stakeholder integration, considered from various theoretical perspectives. Through this review, it was established that the construction industry is significantly responsible for environmental degradation thus it is increasingly called on to change common practices and to adopt sustainable development, which require increased innovation (Toole at al. 2013; Yigitcanlar & Suharto 2015). Through reviewing innovation levels in construction across different regions of the world such as the UK, Canada, and the UAE, it was noticeable that the level of innovation within the construction industry is low compared to other major industries (Toole et al. 2013; Crud 2016; Holzer 2017). This problem encouraged the researcher to examine the factors that influence innovation in this sector. The main factors that are covered in the literature are organizational culture, leadership, team climate, and stakeholder integration (Ozorhon 2013; Ville & Yang 2017; Tabassi et al. 2016; Murphy et al. 2011; Naoum & Egbu 2016; Aouad et al. 2010; Chan & Liu 2014). There is a significant body of knowledge and academic understanding regarding the influencers of innovation at an organizational level especially in terms of organizational culture and team climate. However only a few research studies have focused on how stakeholder integration, and the main factors that influence or are influenced by it, affect innovation at the project level. Since construction is a diverse and project-based industry, it involves the production of unique projects on site by a variety of teams that are temporarily brought together. Much of construction innovation is co-developed at the project level. However, most of the literature has focused on investigating innovation at the firm level, and the project level has largely been ignored. This is primarily because of the difficulties in monitoring the different activities conducted by different parties in each stage of a construction project (Ozorhon 2013; Ozorhon et al. 2010; Murphy et al. 2011; Blayse and Manley 2004; Dulaimi et al. 2002). Therefore, this research intends to fill this gap and look at the factors that influence construction innovation at a project level.

Construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion (Ozorhon 2013; Ozorhon et al. 2010; Murphy et al. 2011). Bearing in mind the multidisciplinary and multiparty nature of construction projects, it was decided that an analysis of innovation at a project level crossing organizations' boundaries would give more concrete ideas and frameworks to assist in identifying the conditions under which innovation could be effective. Hence, the concept of open innovation was explored along with analyzing the construction lifecycle and the innovation process.

It is concluded from this review of the open innovation literature that the networked nature of open innovation allows for more innovation opportunities through having external sources of knowledge; however, it is associated with the involvement of heterogeneous networks of stakeholders that can be risky and difficult to manage (Huizingh 2011; Lichtenthaler 2011; West and Bogers 2014). To better manage this issue, researchers have studied stakeholder 'networks' and developed a number of network models and integration techniques that enable open innovation (Björk & Magnusson 2009; Gould 2012; Hermans et al 2016). Other researchers took another approach and looked at the various procurement methods and their influence on innovation (ICE 2015; CIOB 2010; Walker et al. 2003; Kumaraswamy & Dulaimi 2001). According to the CIOB report (2010), one of the primary reasons for low productivity in the construction industry is the lack of integration of activities across the project life cycle and procurement methods that do not facilitate collaboration between the different stakeholders. The ICE report (2015) further supports that analysis and points out that procurement strategy can greatly influence the scope and capacity for innovation within a project. It further advocates that the greatest opportunities for innovation are during the initial concept. Several elements in particular play an important role: the role of the client/owner, contract types, and an integrated supply chain.

Taking the right decision when it comes to procurement techniques, deciding whether to open the innovation process or close it, selecting the right team members, creating the conditions that facilitate, motivate and sustain innovation is one of the greatest challenges that face the leader of the project (Ozorhon et al. 2014; Aronson et al. 2013; Yukl 2010). Therefore, leadership for innovation and the different leadership styles and characteristics were examined in the literature, each with its positive and negative effects on stakeholders and the innovation. It was noticeable that there are many scholars who have studied leadership for innovation (Yukl 2012; Howell & Shea 2001; Yukl 1999; Nam & Tatum 1997), however, their research studies are focused at the organizational level; project-level leadership characteristics and mechanisms have not been given sufficient attention. Consequently, scholars such as Ozorhon et al. (2014), Lechler (2009), and Aronson et al. (2013) have called for more empirical research to study the effect of leadership on innovation at a project level. There is an increasing body of literature that studies the identity of innovation teams or innovation communities and the role of the leader in facilitating innovation (Ashmore et al. 2004; Rese & Baier 2012). However, these concepts (project level stakeholder integration, leadership, team identity) are fragmented and not linked to each other under the umbrella of open innovation that can help to develop an overall picture of how each aspect influences the other to achieve effective innovation. This research intends to address this research gap and establish the missing links between these concepts to produce a holistic and comprehensive picture of how stakeholders can be integrated for the sake of the innovation project.

2.9 Chapter summary

The chapter provided a literature review of the main concepts that are covered in this research. It commenced with an overview of sustainable development, its policies, its definition, and its status in the construction sector since this research focuses on sustainable innovations in construction projects. The chapter then makes a thorough review of the literature related to innovation. The definitions proposed by prominent innovation theorists and the types and dimensions of innovation. They reveal that the meaning of innovation is miscellaneous and requires a detailed and in-depth understanding of the context under which the innovation is operated. Therefore, the researcher focused on the literature of innovation in the construction sector and assessed the reported levels of innovation in different countries such as Canada, United Kingdom and the UAE were covered. The chapter then reviews the factors that influence innovation in construction and identified the areas that need to be focused on in a project setting. Then it discusses the construction project lifecycle and the innovation process, aligning them together, and relating the concept of open innovation to them. Afterwards it elaborates on open innovation and stakeholder integration by assessing the concept of stakeholders, stakeholder networks, and coordination and collaboration mechanisms to achieve innovation. This led to the exploration of the concept of leadership for innovation and team identity to understand its influence on stakeholder integration and the overall innovation performance.

In summary, the extensive literature review that is presented in this chapter provides essential background knowledge and understanding of stakeholder integration and innovation. Overall, it was found that the number of studies addressing the related aspects that influence and are influenced by stakeholder integration within the construction industry, particularly, at a project level is low. This identified gap in academic and practitioner knowledge is further addressed in the following chapter.

Chapter 3- Conceptual model development

Introduction to Chapter

This chapter covers the development of the conceptual model of the thesis, and the research questions that have been formulated and refined based on the critical review of literature conducted in the previous chapter. Moreover, the chapter describes the operationalization of the model constructs, a critical step prior to the data collection and analysis.

3.1 Theoretical framework and research questions

The literature review provided essential background knowledge on innovation. It explains how innovation is conceptualized, defined and constructed of different types and dimensions. It also describes how open innovation is crucial in construction projects to facilitate stakeholder networking. However, the extant literature falls short in explaining the relationship between open innovation and stakeholder integration in construction projects. Hence, the literature on stakeholders was reviewed as well to identify the connections and relationships between the two constructs.

From the review, it was concluded that open innovation can lead to better networking and collaboration between the different stakeholders for the sake of the innovation goal, however, this needs to be empirically demonstrated. It was also concluded that it is necessary for the innovation team to have a clear identity and membership to achieve a successful innovation and that this is highly affected by the stakeholders input in the project. Therefore, this research proposes a set of relationships hold between those different constructs namely open innovation, leadership for innovation, stakeholder integration, team identity and innovation effectiveness. Through empirically testing this relationship, this research will be able to address the gaps in knowledge in the existing literature through answering the following questions:

RQ1: What is the effect of leadership for innovation on stakeholder integration in an open innovation context?

RQ2: What is the effect of leadership for innovation on team identity in an open innovation context?

RQ3: What is the relationship between stakeholder integration and the innovation team identity?

RQ4: What is the relationship between leadership for innovation, stakeholder integration, and team identity in an open innovation context?

RQ5: How can leadership for innovation, stakeholder integration and team identity lead to effective open innovations throughout the construction project lifecycle?

The following framework illustrates the proposed causal relationships between these constructs.

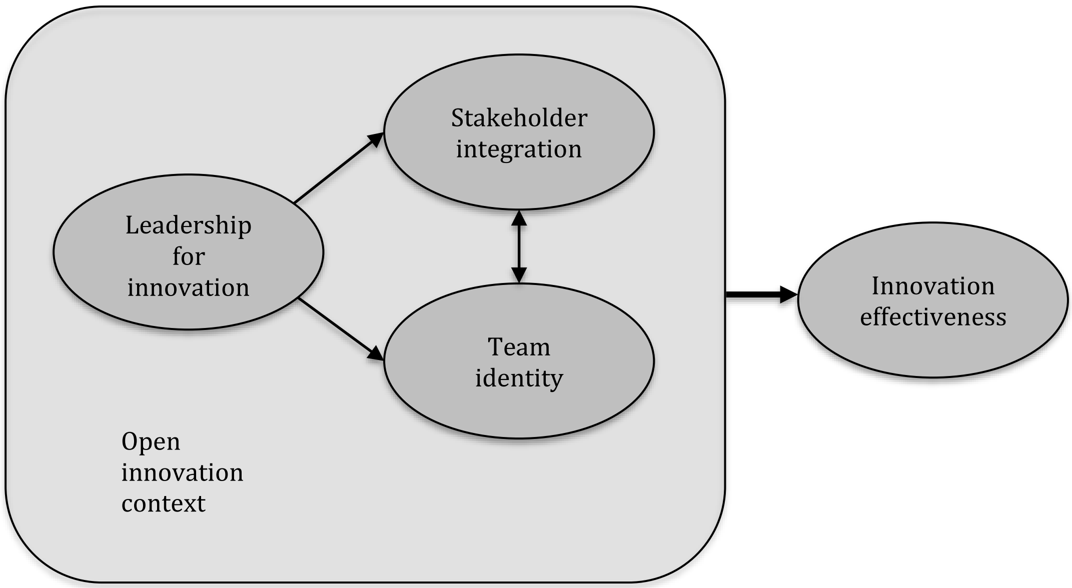


Figure 3-1: The theoretical framework of the thesis.

This research intends to empirically analyse the connections between these different constructs and hence add to existing knowledge. Each of these constructs are explained below:

Leadership is "the process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives" (based on Yukl 2010, p. 26).

Stakeholder integration is "the ability to create positive collaborative relationships with a wide range of stakeholders" (based on Sharma and Vredenburg 1998, p.735).

Team identity is the feeling of belonging of individuals that create some emotional and value significance to them and a sense of membership" (based on

Tajaful and Turner 1979).

Innovation effectiveness is the overall project's outcome that results from implementing the innovation. In the context of the research for this thesis: it is, how the project perceives the overall improvement (including factors such as achieving targets, finance, employee morale), which arises specifically from implementing the innovations (Rese & Baier 2012).

These constructs are assumed by the researcher to have direct effects on each other. For example, it is presumed that leadership influences stakeholder integration, which in turn has a direct influence on team identity and this consequently affects the effectiveness of the innovation under the umbrella of open innovation. However, it would be misleading to assume that the relationships between these constructs are linear and rigid. In practice, the process is very dynamic and goes back and forth. For instance, stakeholder integration takes place throughout the project's life cycle in an open innovation context, thus, it is presumed to be part of the open innovation process as discussed in section 2.4. In the same manner, team identity is created while stakeholders are integrated and ideas and information are exchanged, thus, it is not a linear end result of the influencer but a dynamic, changing process.

To sum up, the literature review that is undertaken for this research informed the development of the proposed conceptual model which shows the possible relationships connecting the five constructs namely open innovation, leadership for innovation, stakeholder integration, team identity and innovation effectiveness. To establish and confirm these relationships, each construct is operationalized so that it could be reliably and accurately measured through qualitative data analysis tools and techniques.

3.2 The operationalization of the model constructs

To measure the model constructs, the general meanings that are derived from the literature are not sufficient. Operationalizing the model constructs is essential to measure the underlying abstract concepts, especially the ones that are associated with feelings and attitudes. Cavana et al. (2001) explained that operationalization could be achieved through examining the behavioural dimensions, facets or properties indicated by the construct. These are then interpreted as observable and measurable elements. The following sections delineate the operational definitions of the model constructs after operationalizing the model context, which is open innovation.

3.2.1 Operational definition of open innovation

Open innovation was briefly explained earlier using Chesbrough's (2006, p. 2) definition: "the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively". This definition indicates that the boundary between the internal and external environment are loosened and the flow of knowledge from inside to outside and vice versa becomes easier.

One of the first empirical studies on open innovation was done by Laursen and Salter (2006). In operationalizing the open innovation construct, their study did not research the different dimensions of open innovation, but rather, examined the breadth and depth of firms' external search strategies. To define their measure, the authors depended on CIS (Community Innovation Survey), which is an existing statistical instrument that measures the overall progress in the field of innovation and gives a proxy evaluation. One major shortcoming of this method is the high probability of the conflated findings as argued by Flatten et al. (2011).

Other scholars such as Van de Vrande et al. (2009) considered open innovation as a multidimensional construct in examining the technology exploitation and technology exploration dimensions in their study. According to these authors, technology exploration takes place when external sources of knowledge are used to improve current technological developments. This can be achieved through different practices such as external participation, inward IP licensing, external networking, outsourcing R&D and customer involvement. In contrast, technology exploitation focuses on leveraging the internal technological capabilities outside the firm's boundaries through venturing, outward IP licensing and employee involvement. Although these measures provide strong grounds for studying open innovation, Van de Vrande et al. (2009) recommended that future research defines open innovation following a more comprehensive approach.

More recent researchers, such as Hung and Chiang (2010) empirically studied the proclivity of companies for open innovation. Still, the measurement data they reported seems to be limited. Among the eight items they used to evaluate the breadth of the companies' intentions regarding open innovation, none included external participation, employee and customer involvement and venturing. This lack of multidimensionality encouraged Rangus (2016) to upgrade the measurement tool by thoroughly examining the measures for open innovation in the literature and summarizing them. After identifying eight potential measures and 121 potential items for open innovation proclivity, he conducted a study and interviewed ten experts in the field and ten entrepreneurs. Then he refined the scale to six open innovation proclivity dimensions and 30 items on the proclivity for open innovation.

To carry out the operationalization, a theoretical synthesis of the ‘open innovation’ construct was carried out followed by the operational details of the construct. The rationale behind synthesizing the construct is based on the fact that some dimensions of open innovation exhibit similar concepts and some others are complementary to each other. After examination of key definitions, factors and indicators of all of the dimensions, the theoretically compatible ones were then incorporated under the relevant categories to represent the conceptually sound dimensions of the construct.
The dimensions that had very common variables such as (Inward IP licensing and External participation, and Outsourcing R&D and External networking) were grouped together to avoid repetition and to simplify the presentation of the data (See table 3-2).
Each dimension in the operational details table contains relevant measurement variables adapted from the literature. This process is repeated for every construct. Table 3-2 summarizes the operational details of open innovation in terms of the developed dimensions, along with their descriptions, measurement variables and associated references.

Table 3-1: Synthesis of open innovation (Adapted from Rangus et al. 2016).

Area of study	Author(s)	Synthesized dimensions of open innovation
Degree of openness	Teirlinck and Spithoven (2008)	- In house innovation - Outsourcing innovation - Co-developing innovation
Open innovation proclivity	Hung and Chiang (2010)	- Degree of company's access of available external knowledge
Open innovation climate	Remneland-Wikhamn and Wikhamn (2011)	- Innovation/flexibility - Outward focus - Reflexivity
	Bahemia and Squire (2010)	- External search breadth - External search depth - Degree of ambidexterity
	Laursen and Salter (2006)	- External search breadth - External search depth
	Inauen and Schenker-Wicki (2011)	- Cooperation intensity with different stakeholders
	Inauen and Schenker-Wicki (2012)	- Licensing - Open-source innovation - Participation in other companies - Sale and/or divestment - In-house exploitation and/or distribution
	Lichtenthaler (2009)	- Commercialisation of technological knowledge
	Acha (2008)	- External sourcing of information - Collaboration - External sourcing of R&D and knowledge
	Chesbrough and Crowther (2006)	- Open innovation - External innovation - Sourcing innovation - Innovation licensing
	Lichtenthaler (2008), Lichtenthaler and Ernst (2009)	- External technology acquisition - External technology commercialisation
	Santamaría, Nieto and Barge-Gil (2010)	- External sources (external R&D, consultant, hiring personnel) - Hybrid mechanisms (joint ventures, homogeneous alliances, heterogeneous alliances)
	Schroll and Mild (2011)	- Inbound cooperation - Inbound acquisition - Outbound open innovation
	van de Vrande, de Jong, Vanhaverbeke and de Rochemont (2009)	- Venturing - Outward IP licensing - Employee involvement

Table 3-2: Operational details of open innovation (Adapted from Rangus et al. 2016).

Dimension	Description	Measurement variables	References
		External knowhow/technology present new opportunities	Chesbrough & Crowther (2006)
		Buying IP or willing to buy the IP of other companies to support internal development	Van de Vrande et al. (2009) Chesbrough & Crowther (2006)
		Systemic ways of searching for external knowhow/technology	Van de Vrande et al. (2009)
		Willing to invest in a new company	Chesbrough & Crowther (2006)
		Acquiring R&D services from knowledge institutions	Van de Vrande et al. (2009)
		Cooperation with knowledge institutions	Perkmann & Walsh (2007)
		Informal ties with researchers	Fabrizio (2006)
		Collaboration with individual inventors, high tech start-ups, and spin-offs of large firms.	Chesbrough (2006)
		Cooperation with competitors	Bergman et al. (2009) Maula et al. (2006)
		Cooperation with consultancy companies	Tether & Tajar (2008)
		Collaboration with suppliers	Chesbrough (2003)
		Involvement of clients/end users	van de Vrande et al. (2009)
		Cooperation with customers	Gassmann & Enkel (2004) van de Vrande et al. (2009)
		Users testing new products/services	Gassmann & Enkel (2004)
		Idea competitions.	Piller & Walcher (2006)

Employee involvement	Involving the employees who are not in R&D through considering their knowledge and initiatives, taking up their suggestions, enabling them to implement ideas, or creating autonomous teams to realize innovations.	Encouragement of communication among unrelated groups of employees	Dodgson et al. (2006)
		Employee rotation	O'Connor (2005)
		Idea seekers	Chesbrough (2006) O'Connor (2005)
		Informing employees about the importance of innovation to the business	Chesbrough (2003)
		Promoting internal idea exchanges.	Huston and Sakkab (2006)
		Considering the suggestions of employees not included in R&D process	van de Vrande et al. (2009)
		The use external sources of knowhow/technology	Van de Vrande et al. (2009) Chesbrough (2003
		Establishing spin-ins and spin-offs	Chesbrough (2003) Gassmann & Enkel (2004)
		Cooperate with external partners at launching new products/services	Zahra (1993)
		Willing to sell IP or part of IP	Van de Vrande et al. (2009)
		Introduction of our products/services through investing into a new joint venture	Gassmann (2006)
		Revealing technology	West and Gallagher (2006)

3.2.2 Operational definition of leadership for innovation

Leadership was briefly defined earlier as: "the process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives" (based on Yukl 2010, p. 26).

Since the main focus of this research is on innovation, leadership for innovation is defined as the process of influencing others to understand and agree about what needs to be done to achieve innovation and how to do it, and the process of facilitating individual and collective efforts to accomplish the innovation.

Several theories that have focused on studying effective leadership styles pertaining to innovation and creativity were identified and discussed in Chapter 2. Accordingly, the operational definition of leadership for innovation is developed by four prevalent leadership styles that are discussed in the literature: (1) transformational leadership (TL) (Bass and Avolio, 1994; Kouzes and Posner, 1995; Podsakoff et al., 1990); (2) change-oriented leadership (CL) (Yukl et al., 2002); (3) innovation championing (IC) (Howell et al., 2005); and (4) leader-member exchange (LMX) (Graen and Uhl-Bien, 1995). To commence the operationalization, the concepts of the above leadership styles were synthesized. This procedure was undertaken because several behavioural features that are related to these leadership styles display similar concepts and some are complementary to each other. Therefore, key definitions, factors and indicators of all four leadership concepts were examined. Well-matched factors were then incorporated under relevant categories to represent the dimensions of the construct.

Table (3-3) summarises the different views of leadership for innovation in the literature, with respect to the developed dimensions of the Leadership for Innovation construct, which include:

(1) Encouraging and stimulating innovation: represents the leader who continuously

seeks, inspires, motivates and supports creative and new ideas;

(2) Providing and inspiring vision: represents the leader who creates, communicates and inspires a shared vision;

(3) Individualized support: represents the quality of the relationships between the leader and the team, and the degree of support that the leader offers.

(4) Teamwork development: represents the degree to which the leader encourages teamwork and engages team members in the decision-making process.

(5) Stakeholder integration: represents the degree to which the leader communicates and engages with stakeholders throughout the project and the degree to which the leader promotes and encourages it.

Each of these dimensions contains relevant measurement variables adapted from the literature. Table 3-4 summarizes the operational details of the 'Leadership for Innovation' construct in terms of the developed dimensions, along with their descriptions, measurement variables and associated references.

Table 3-3: Synthesis of leadership for innovation

Synthesized dimensions (leadership for innovation)	TL	TL	TL	LMX	CL	IC
	Podsakoff et al. (1990)	**Bass and Avolio (1994)**	**Kouzes and Posner (1995)**	**Graen and Uhl-Bien (1995)**	**Yukl et al. (2002)**	**Howell et al. (2005)**
Encouraging and stimulating innovation	Provides and appropriate model Intellectual stimulation	Intellectual stimulation Idealized influence	Challenging the process Encouraging the heart Modeling the way		Envisioning change Encouraging innovation thinking Taking personal risks	Expresses enthusiasm and confidence Persists under adversity
Providing and inspiring vision	Identifies and articulates a vision High performance expectations	Inspirational motivation	Inspiring a shared vision			
Individual support	Provides individualized support	Individual consideration		Leader-member exchange		
Teamwork development	Fosters the acceptance of group goals		Enabling others to act			Gets the right people involved
Stakeholder integration		Actively engaging followers and stakeholders				Promote communication with stakeholders

Table 3-4: Operational details of leadership for innovation

Dimension	Description	Measurement variables	References
		Look constantly for opportunities to change/improve the organization	Bass & Avolio (1994) Yukl et al. (2002) Howell et al. (2005)
		Seek out and promote new technologies, process, techniques and/or idea to solve problems	Howell et al. (2005) Kouzes & Posner (1995) Yukl et al. (2002)
		Display a sense of power and confidence	Yukl et al. (2002) Howell et al. (2005)
		Like people to try new ways of doing their jobs	Yukl et al. (2002) Howell et al. (2005) Kouzes & Posner (1995) Skipper & Bell (2006)
		Encourage others to develop their own ideas	Bass & Avolio (1994) Howell et al. (2005) Yukl et al. (2002) Kouzes & Posner (1995) Skipper & Bell (2006)
		Show appreciation for creativity by giving public and meaningful recognition	Bass & Avolio (1994) Howell et al. (2005)
		Create and express an exciting vision of the future	Bass & Avolio (1994) Kouzes & Posner (1995) Podsakoff et al. (1990) Skipper & Bell (2006) Graen & Uhl-Bien (1995)
		Inspire others with plans for the future	Bass & Avolio (1994) Kouzes & Posner (1995)
		Make the vision clearly understood	Bass & Avolio (1994) Kouzes & Posner (1995)
		Understand job problems and needs of individuals	Bass & Avolio (1994) Graen & Uhl-Bien (1995) Skipper & Bell (2006)
		Approachable and easy to talk to about job-related problems	Graen & Uhl-Bien (1995)
		Spend time teaching and coaching	Graen & Uhl-Bien (1995) Skipper & Bell (2006)
		Recognize potential and contribution of individuals	Podsakoff et al. (1990)
		Use power to help individuals solve problems	Bass & Avolio (1994)

Teamwork development	Represents the degree to which the leader encourage teamwork and engage team members in the decision making process	Foster collaboration by promoting cooperative goals	Bass & Avolio (1994) Podsakoff et al. (1990) Skipper & Bell (2006) Yukl et al. (2002)
		Encourage members to share information and resources to foster the climate of trust and collaboration	Podsakoff et al. (1990) Kouzes & Posner (1995) Yukl et al. (2002)
		Consult with members when making decisions	Yukl et al. (2002)
		Promotes communication with stakeholders	Bass & Avolio (1994) Howell et al. (2005)
		Actively engage the team and stakeholders	Bass & Avolio (1994) Jung et al. (2003)
		Consider stakeholder needs and demands	Howell et al. (2005) Jung et al. (2003)
		Aware of the different type of stakeholders and their influence	Howell et al. (2005) Jung et al. (2003)
		Aware of stakeholders' power, urgency, and legitimacy.	Mitchell et al. (1997)

3.2.3 Operational definition of stakeholder integration

Based on the literature review (Chapter 2), stakeholder integration is defined as the ability to create positive collaborative relationships with a wide range of stakeholders (Sharma & Vredenburg 1998, p. 735). According to the literature, these collaborative relationships are results of a number of dimensions: (1) knowledge of stakeholders and their needs (2) interaction between stakeholders and the organization and/or the project, and (3) taking decisions which take stakeholders' demands into account (Post et al. 2002).

Jose et al. (2010) argue that the dimensions of stakeholder integration are related to the previous dimensions of stakeholder management. For example, the knowledge dimension in SI related to the rational level of stakeholder management that was categorised by Freeman (1984). Whereas the interaction dimension belongs to the process level and adaptation incorporates the transactional level. The dimensions can also be related to the components of stakeholder management proposed by Donaldson and Preston (1995), which are attitudes, structures, and practices. For instance, the time and resources needed to obtain knowledge of stakeholders reflect the three components. Similarly, these components are present when devoting time and resources to interact with stakeholders and respond to their needs and demands and integrate their interests.

From previous literature, we can conclude that the activities firms employ to know their stakeholders and identify their interests and demands are one of the first steps to integrate them. This is performed in a dynamic manner since critical stakeholders change over time (Hart & Sharma 2004). Therefore, the continuous exploration of stakeholders enriches diversity in the decision process, allows for the development of new insights and creates room for innovation (Wu & Eweje 2008). After that, the interaction and communication among various stakeholders facilitate the accessibility to creative and practical knowledge (Ayuso et al. 2006). Finally, the employment of strategies that respond to stakeholders' demands eases the institutionalization of collective knowledge. Consequently, through stakeholder integration, firms and projects can produce new knowledge and achieve innovative solutions.

To commence the operationalization of stakeholder integration, the dimensions discussed earlier were synthesized. Table (3-5) summarises the different views of stakeholder integration in the literature, then Table (3-6) illustrates the operationalization of the concept.

Table 3-5: Synthesis of stakeholder integration

Area of study	Author(s)	Synthesized dimensions of stakeholder integration
Stakeholder management	Freeman (1984)	Rational Process Transactional
Stakeholder management components	Donaldson and Preston (1995)	Attitudes Structures Practices
Organizational behaviour	Heugens et al. (2002) Sharma & Vredenburg (1998)	Organizational learning Competitive advantage
Stakeholder analysis	Wu & Eweje (2008) Ayuso et al. (2006)	Dynamic capabilities Continuous exploration of stakeholders (knowledge and demand) Multiple communication channels
Stakeholder integration	Wu & Eweje (2008) Heugens et al. (2002) Freeman (1984)	Interactions with multiple stakeholders Building value and trust Implementation of strategies to meet stakeholders' demands Adapting behaviour according to the demands of their stakeholders.
	W. R. Scott (1998) Rowley (1997) Meyer & Rowan (1991) Heugens et al. (2002) Jose et al. (2010)	Buffering (forging close links with representative organizations)
	Rowley (1997) Heugens et al. (2002) Jose et al. (2010)	Co-optation (absorbing new elements into the leadership or policy-determining structure of an organization to avoid threats)
	Heugens et al. (2002) Jose et al. (2010)	Mutual learning (between unlike organizations)
	Heugens et al. (2002) Jose et al. (2010)	Meta-problem solving (collaborative processes operative at the network level)

Table 3-6: Operational details of stakeholder integration

Dimension	Description	Measurement variables	References
		Keeping documents and records of the previous relationships with stakeholders	Polonsky (1995) Maignan & Ferrell (2004) Mitchell et al. (1997) Friedman & Miles (2002) Elias et al. (2002) Jose et al. (2010)
		Devoting time and budget to know stakeholders characteristics (performance, relationships among them, positions of power, importance)	Polonsky (1995) Maignan & Ferrell (2004) Jose et al. (2010)
		Devoting time and budget to know stakeholders' demands	Polonsky (1995) Maignan & Ferrell (2004) Elias et al. (2002) Mitchell et al. (1997)
		Obtaining feedback about the different stakeholders	Polonsky (1995) Maignan & Ferrell (2004) Elias et al. (2002)
		Having intensive and frequent communication with and among stakeholders (unidirectional-bidirectional, formal-informal, regular-occasional, structured or not, oral or written)	Grafé-Buckens & Hinton (1998) Green & Hunton-Clarke (2003) Maignan & Ferrell (2004) Sharma & Vredenburg (1998)
		Developing personal relationships with stakeholders (for the generation of trust between parties)	Green & Hunton-Clarke (2003) Maignan & Ferrell (2004) Jose et al. (2010)
		Educating stakeholders	Green & Hunton-Clarke (2003)
		Choosing appropriate strategies to deal with stakeholders and to identify their degree of satisfaction	Lorca & Garcia-Diez, (2004) Burchell & Cook (2008)
		Consulting with stakeholders and asking them for information before taking decisions	Sharma & Vredenburg (1998) Green & Hunton-Clarke (2003)
		Stakeholders participate in the project's process of taking decisions	Green & Hunton-Clarke (2003) Maignan & Ferrell (2004)

	Dedicating time and resources to assessing and prioritizing the demands of the different stakeholders	Green & Hunton-Clarke (2003)
	The company makes a special effort to prepare the information for the different stakeholders	Maignan & Ferrell (2004) Payne & Calton (2004)
	There is frequent managerial debate about the demands of the stakeholders	Maignan & Ferrell (2004)
	Changing objectives in line with stakeholders' demands	Polonsky (1995)
	The projects policies are priorities are adapted to stakeholders' demands	Maignan & Ferrell (2004) Polonsky (1995)

3.2.4 Operational definition of team identity

Based on the literature review (Chapter 2), team identity is defined as the feeling of belonging of individuals that create some emotional and value significance to them and a sense of membership (Tajaful & Turner 1979, p. 292).

The nature of innovation projects outlines the tasks and roles of members through informal rules that the team adopt to regulate team members' behaviour gradually (Rese & Baier 2012). In this case, the norms that define team members' behaviour are highly dependent on the interactions among them and are related to the group identity (Postmes & Spears 2000).

Gerybadze (2003, p. 146) discussed the existence of exceptionally strong ties between members of an innovation project and their strong commitment to the informal 'community of innovation'. Fichter (2009, p. 360) explains innovation community, or the innovation team as we call them in this research, and states that "the community members collaborate closely and informally, and they perceive themselves as a ‘team’, a ‘group’ or a similar entity, with a feeling of group identity”.

As discussed previously in Chapter 2, team identity can be measured considering two aspects, which are measuring team identity at a team or group level, and at an individual level. Measuring team identity in innovation at the team level is done through studying the 6 dimensions that Friedlander (1987) proposed which are cohesion, boundary clarity, degree of match, local language, climate, permeability with the addition of “cognitive similarity” that Rese and Baier (2012) considered in their research. They argue that team identity develops when people become aware of each other’s (similar) cognitions.

Measuring team identity in innovation projects at an individual level is done through studying the 7 dimensions that Ashmore et al. (2004, p. 83) have developed based on the efforts of different scholars within social psychology. These dimensions are self-categorisation, evaluation, importance, attachment, social embeddedness, behavioural involvement, and content and meaning. This multidimensional perspective emphasizes that team identity may be regarded as a psychological state, which can be measured and observed to reveal the affective content of a member's relationship with the team (Foreman & Whetten 2002).

Table (3-7) summarises the different views of team identity in the literature then Table (3-8) exhibit the dimensions of group level team identity which were adopted from (Rese & Baier 2012) that provided comprehensive and empirically tested dimensions and measures. Table (3-9) demonstrates the operationalization of the individual level team identity.

Table 3-7: Synthesis of team identity

Area of study	Author(s)	Synthesized dimensions of stakeholder integration
Social identity theory	Tajfel and Turner (1979)	• Social categorization • Social comparison • Social identification • Group membership • In-groups • Out-groups
Social Groups	Alderfer & Smith (1982)	• Group boundaries • Group membership
Group identity	Friedlander (1987)	• Cohesion • Boundary clarity • Degree of match • Local language • Climate • Permeability
Innovation Communities	Gerybadze (2003)	• Group dynamics
Team identity	Ashmore et al. (2004)	• Self-categorization • Evaluation • Importance • Attachment • Social embeddedness • Cognitive awareness • Behavioural involvement

Table 3-8: Operational details of team identity at group level (Rese & Baier 2012).

Team identity at a Team level			
Dimension	**Description**	**Measurement variables**	**References**
		The group of key actors in the innovation behaves like a team	
		The team members see themselves as "insiders"	
		The team members are definitely perceived as an entity by outsiders.	
		All members currently involved fit into the group very well.	
		Every member of the team knows exactly who is member of the team and who is not.	
		Team members have a close exchange with other teams.	
		Team members have many links to other partners or networks.	
		The team is open for new or additional partners or members.	
		Team members have access to contacts with relevant expertise concerning the innovation project.	
		Group members have very good access to decision-makers who are important for the innovation project.	
		It is important to be part of the project for the team members.	
		There is a strong tie between team members and the project.	
		There is an integration of every team member into the group.	
		There are no personal conflicts within the group.	
		There is a personal affinity amongst the team members.	

		There is pride in being in the group.	
		There is an agreement among the team members upon the importance of the innovation.	
		Team members use the same "language" (the same terminology, technical language etc.).	
		There are no conflicts due to conceptual misunderstandings.	
		There is confidence in the atmosphere.	
		The working atmosphere is cooperative among the team.	
		Opinions are expressed openly among all members of the team.	
		Team members feel free to express ideas without being called upon to do so.	

Table 3-9: Operational details of team identity at an individual level

Team identity at an Individual level			
Dimension	**Description**	**Measurement variables**	**References**
		Placing self in social category	Phinney (1995) Ashmore et al. (2004) Henderson-King & Stewart (1994)
		Goodness of fit/perceived similarity/prototypicality	Ashmore et al. (2004) Abrams (1998)
		Perceived certainty of self-identification	Ashmore et al. (2004)
		Collective Self-Esteem	Luhtanen & Crocker (1992) Ashmore et al. (2004)
		Satisfaction	Ashmore et al. (2004)
		Identification with a superordinate group	Ashmore et al. (2004)
		Public acceptance	Luhtanen & Crocker (1992)

Importance	The degree of importance of the innovation team membership to the team member's overall self-concept	Explicit importance (significance, strength, certrality, importance, prominence	Luhtanen & Crocker (1992)
		Implicit importance (salience, centrality, elevation, importance)	Ashmore et al. (2004)
		Sense of common fate	Ashmore et al. (2004)
		Affective commitment	Phinney (1992)
		Interconnection of self and others	Mae1 & Tetrick (1992)
Social embeddedness	The degree of embeddedness of the collective identity is in the team member's everyday ongoing social relationships	Everyday social connections involve people of the social category in question;	Seller et al. (1997) Ashmore et al. (2004)
		Speaking the same language	Ashmore et al. (2004)
		Ethnic behaviour	Phinney (1992)
		Self-attributed characteristics	Ashmore et al. (2004)
		Ideology (beliefs about experience and history of the team over time.)	Sellers et al. (1998)
		Narrative (the internally represented story that the person has developed regarding self and the social category in question.)	Ashmore et al. (2004)

3.2.5 Operational definition of innovation effectiveness

Innovation effectiveness in the context of this PhD study can be summarised as how the project perceives the overall benefit of the innovation (Klein et al., 2001). Objective data such as financial information was excluded since it was expected that it would be incomplete at the time data was collected (Calantone et al. 2003). Thus, two dimensions were considered to measure innovation effectiveness, which are the future/expected innovation potential and the effective/efficient innovation capacity (Hogl & Gemunden 2001; Rese & Baier 2012).

Table 3-10: Operational details of innovation effectiveness

Dimension	Description	Measurement variables	References
		The success of innovation project according to the team	
		The quality of project results so far	
		The satisfaction of team members with the present result	
		The rework that the innovation needs	
		The indication of future success	
		The achievement of the innovation goals so far	
		Cost efficiency so far	
		The project is within schedule	
		The project is within budget	

3.3 Chapter summary

This chapter presented the development of the theoretical framework and the formulation of five research questions, in response to the identified research gaps. To answer these research questions, a conceptual model was developed, based on a critical review of the literature in Chapter 2. The developed model encapsulates four constructs: (1) leadership for innovation; (2) stakeholder integration; (3) innovation team identity; and (4) innovation effectiveness. In addition to these constructs, the open innovation element was also considered and operationalized to guide the study of the context of the research. Furthermore, the constructs were operationally defined and rendered measurable, based on the synthesis of various theories, concepts, and published survey instruments. The details of the operationalized constructs were presented in terms of their theoretical dimensions and associated measurement variables. These operational definitions of the model constructs served as an essential basis for developing a set of reliable measures to capture the meaning of the constructs in the subsequent research stages, described in the following chapter.

Chapter 4- Methodology

Introduction to Chapter

From the review of related literature, the significance of conducting a study on the effect of stakeholder integration on innovation effectiveness was presented. This chapter justifies the choice of a qualitative exploratory case study methodology. The chapter starts with the exploration of the qualitative epistemological and methodological bases of the study. Afterwards, it discusses the methodology and the appropriateness of the qualitative exploratory case study method that is adopted in this research. Following that, the specific research strategies of the case study are discussed. Finally, the authenticity and reliability of the study, its ethical considerations, and limitations are respectively considered and explained.

4.1 Research approach

Prior to conducting a research study, it is necessary for the researcher to understand and think about the philosophical assumptions to clarify the research design (Easterby-Smith et al. 2002). This assists the researcher to establish the kind of evidence that is required for the research and the proper ways to gather and interpret evidence to provide sound answers to the research questions. In addition to that, it aids in recognizing the limitations of the different research approaches, hence, enabling the researcher to formulate an appropriate research design.

Informed by the limitations of previous studies and the nature of the research for the thesis, the author intends to understand the influences of stakeholders, the innovation leaders, and the innovation team members on each other and the innovation in an open innovation project context. This approach is considered relevant to the disciplines of the social sciences. In the realm of social science research, there are two prevailing philosophical traditions: positivism and social constructionism (Easterby-Smith et al. 2002). A positivist believes that the independent reality and the objective of human behaviour will be reflected in human experience (Weber 2004). Thus, the researcher utilises organised methods that result in empirical observations to complement the deductive logic of theory to assist in the development and confirmation of hypotheses to forecast patterns of human actions (Love et al. 2002, Payne & Payne 2004). Quantitative research often accompanies this school of thought as it utilises statistical measures and procedures to compare a large number of observations in order to be able to generalise from a sample to a larger population (Mitchell and Bernauer 1998).

Alternatively, interpretivism or social constructionism emphasises explaining the reasons behind the different experiences and perceptions among people. It is often associated with inductive approaches where a realization and an explanation of how people create and maintain their social world is achieved through a detailed observation and interaction with people (Love et al. 2002). Thus, the interpretivist believes that social reality is not objectively determined but rather, is socially constructed. Qualitative research often accompanies social constructionism as it uses few selected cases in order to analyse and represent the problem most often through comparatively large amounts of textual data (Mitchell & Bernauer 1998).

Given that the nature of this thesis is analytical and is very much related to the social relationships and the relationships between individuals within a project context (the stakeholders, the leaders, and the team members); a constructionist qualitative approach is believed to be more appropriate. Hence, a proper understanding of qualitative research will further justify the choice and assist in designing the research.

4.1.1 Qualitative approach

Within this section, the rationale for choosing a qualitative approach in conducting this research is discussed after providing a general review of the history of qualitative research and its associated paradigms and characteristics.

4.1.1.1 Overview of qualitative research

The establishment of qualitative research goes back to 1920's and 1930's as a result of the work of the "Chicago school" in sociology and the works of some scholars such as Boas, Mead, Benedict, and Malinowski based in anthropology (Denzin & Lincoln 1994, p. 1). The term was later used in the social sciences in the 1960's (Bogdan & Biklen 2007). This type of research has been influenced since the 1970s by different ideological and political practices (Bogdan & Biklen 2007) in addition to many theories, such as social constructionism or constructivism, critical theory, neo-Marxist theory, and feminism (Chase 2005).

Qualitative research traditions can be summarized divided in three groups according to Gall, Gall, and Borg (2007). These traditions are considered the basic form of qualitative research. The first group of inquiries examines lived experiences; the second group investigates society and culture whereas the third group deals with language and communication. These qualitative research groups are classified according to the type of research they are associated with as shown in the table below,

Table 4-1: Qualitative research groups and their traditions

Qualitative research group	Research tradition
Lived experiences	• Cognitive psychology • Phenomenology • Phenomenographic research • Life history research
Society and culture	• Action research • Ethnography • Cultural studies • Critical theory research • Ethnomethodology • Symbolic interactionism research
Language and communication	• Narrative analysis • Ethnographic content analysis • Ethnography of communication • Hermeneutics • Semiotics • Structuralism and poststructuralism

4.1.1.2 Paradigms of qualitative research

The "Interdisciplinary, transdisciplinary and counterdisciplinary" nature of a qualitative research study, as was mentioned by Denzin & Lincoln (1994, p. 3) makes it very difficult to explain each research approach under exclusively one group. It is the assumptions about reality that the researcher conveys in his/her research that decides the appropriateness of the methodology and methods that the researcher will use (Crotty 2003). Hitchcock & Hughes (1989) suggest that assumptions are major drivers of inquiry. Hence, different researchers can present varying assumptions about a specific phenomenon (Cohen et al. 2011). This according to Denzin and Lincoln (1998) depends on the various ways of constructing reality ('ontology') which consequently develops the different forms of knowledge of that specific reality ('epistemology') and influences the assumptions that researchers then make. Accordingly, researchers develop particular ways of assessing that reality (‘methodology’) to aid in exploring, discovering and explaining whatever the researcher wants to know more about (Denzin & Lincoln 1998).

Guba and Lincoln (1994) explained the basic belief system of researchers through classifying them into ‘paradigms’. The ontological, epistemological and methodological questions are what formulate a paradigm. Four paradigms were identified which are contemplated as the basic assumptions of various qualitative research approaches. The four paradigms include the positivist paradigm, postpositivist paradigm, constructivist paradigm, and a paradigm from critical theory and related ideological positions (Guba & Lincoln 1994).

The constructivist paradigm views reality as complex, socially constructed, and ever changing. The approach uses the researchers as an instrument to conduct the study where they interact with the language and thought of the wider society in their social context. The researchers examine and interpret patterns in the analysis and write up discussions in a descriptive manner, which usually results in a hypothesis and a theory (Glesne 2011). Using qualitative measures, the researcher is able to identify and verify new meanings and to better connect the existing knowledge making it comprehensible to others (Stake 1995).

Very similar to the constructivist paradigm, Guba and Lincoln (1994) explained the critical theory paradigm as assuming reality in a series of structures that are formulated as real by social, political, cultural, economic, ethnic, and gender factors during certain historical periods. This paradigm also requires a dialectical dialogue between researchers and the subjects of investigation. However, critical theory researchers usually bound themselves to issues of social justice and conceptualise their research as part of the struggle for attaining a better world (Kincheloe & McLaren 1994).

The opponent of these two paradigms is the positivist paradigm. The two ontological approaches differ from each other in the fact that positivists believe that any phenomena can be tested and falsified through systematically designed empirical observations rather than using more general, informal inductive approaches. The positivist approach usually starts with a hypothesis or multiple hypotheses, which are tested in an experimental and deductive way using formal instruments throughout the research to approve or falsify them (Glesne 2011). During the procedures, researchers detach their subjectivities and seek to analyse the phenomenon in a very objective manner.

Postpositivist paradigm is often argued to be an improvement on the positivist paradigm as it responds to a number of the criticisms made about positivism. These two paradigms are usually associated with quantitative research. However, in the early years of qualitative research inquiry, some researchers utilized the traditions of positivists and postpositivists with “less rigorous methods and procedures” (Denzin & Lincoln, 1994, p. 5).

4.1.1.3 Characteristics of qualitative research

Researchers such as Morrison (2002) and Bogdan and Biklen (2007) explained the characteristics of qualitative research by stressing that not all qualitative research represents all features equally. The characteristics can be summarized as the following:

Table 4-2: Characteristics of qualitative research

Characteristics of qualitative research	Explanation	Resource
Naturalistic	Human behaviour is significantly influenced by the context.	Bogdan & Biklen (2007)
Intersubjective	The researcher empathizes with the subjects and understands the research phenomenon from inside to be able to reflect and interpret data from their perspective.	Morrison (2002) Gall et al. (2007)
Inductive	Theory emerges from the bottom up. It begins with some sensitizing concepts or a conceptual framework.	Bogdan & Biklen (2007) Morrison (2002) Miles & Huberman (1994)
Descriptive	Nothing is trivial. Everything can be interpreted to help in understanding the investigated phenomenon. It can take the form of words or pictures.	Bogdan & Biklen (2007)

These different characteristics of qualitative research are relevant to this study because it looks mainly at the relationships between stakeholders, leaders and team members, which is very qualitative in nature. First of all, the research for this thesis can be considered naturalistic as it is conducted in a natural setting and not in a laboratory context. In addition, the project context is fundamentally inseparable from the phenomenon under investigation (stakeholder integration and innovation effectiveness). Therefore, a naturalistic approach would accurately assess the behavioural events in an authentic manner using qualitative tools of investigation such as observation.

Second, due to the inseparability of context (open innovation project) and the investigated constructs (stakeholder integration, team identity, leadership) it was felt critical that the researcher is personally involved with the study participants to better understand the phenomena under investigation. Through personal involvement and empathy, the researcher can reflect on each stakeholder and team member accurately and understand his or her behaviours and ways of thinking.

Third, the inductive nature of this research permits flexibility to explore a wide range of variables as the study is conducted without the need for preconceived hypotheses. Utilizing a bottom-up approach, the researcher begins with specific observations and measures formulating a conceptual framework after conducting a thorough review of the related literature. Then she detects patterns and regularities. After that, she formulates some questions that can be explored. Finally, the researcher completes the study by developing some general conclusions and new concepts and theory (Mayring 2007).

Finally, it is acknowledged that this study is very descriptive in nature as it intends to explore the wide range of relationships between innovation leaders, stakeholders, and innovation team members. The overall research intent is to thoroughly interpret the complexities of the relationships and behaviours of the subjects involved in order to understand their varied influences on the effectiveness of innovation.

4.1.2 The appropriateness of qualitative research to the study

Qualitative research traditions with constructivist epistemological orientations are believed to be the best choice to derive sound data and conclusions for this research. The study assumes that stakeholder integration is situation-oriented and constructed in the daily practices in the project context. Situated in the construction project process, this qualitative research explores the effect of stakeholder integration on innovation by studying the related influences such as team identity and leadership for innovation.

Therefore, stakeholder integration is acquired in an interactive dynamic system and its meaning to the individuals in the project is not obtained from textbooks but rather from their daily practices and their perceptions about the phenomenon. This type of inquiry falls within the constructivist paradigm.

Through observation, long-term interaction and socialization with the stakeholders and the innovation team members, it is intended that an in-depth understanding of the nature of their relationships will be achieved (Glesne 2011). Researchers such as Aaltonen et al. (2008), Olander and Landin (2005), Zhai et al. (2009) and Bourne & Walker (2006), have adopted this approach to study team members and stakeholders with different methods of data collection that led them to the achievement of respectable findings and conclusions and have encouraged such an approach and method of data analysis. These researchers have advocated the importance of developing more dynamic ways of studying stakeholders utilizing qualitative methods. They have indicated that using qualitative methods leads to a more realistic picture of the dynamics of stakeholders and the interactions between them deriving more accurate, representative and vibrant conclusions A significant number of researchers who prefer to use qualitative methods have employed case studies to conduct their research on stakeholder management, each with their own preferred set of methods of data collection and analysis. To sum up, in order to have a better understanding of stakeholder integration and innovation effectiveness in innovative construction projects, this research argues that a qualitative case study approach is most appropriate for this investigation. It combines the research methods of qualitative inquiry and the research techniques of a case study. In the next section, the rationale for using a qualitative case study methodology is outlined.

4.2 Research method

4.2.1 Case studies method

A case study method is believed to be the most appropriate fit for this study as it offers real life context answers to the research questions. The rationale behind choosing this method is explained later on in this chapter. Yin in *Case Study Research Design and Methods* (2003, p. 13), defines case study research as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident." In general, case studies can be descriptive, exploratory and explanatory: *descriptive case studies* discuss what the researcher have gathered about the case; *exploratory case studies* concentrate on theory and/or hypothesis development; and *explanatory case studies* focus on theory and/or hypothesis testing (McCutcheon & Meredith 1993; Yin 2003). Fundamentally, when research questions focus on the 'how and why' questions then the explanatory case study approach is the most suited method. On the other hand, descriptive case studies are the best fit to answer the 'who and where' questions. Whereas research questions focusing on the 'what' questions are usually associated with exploratory case studies or experiments or surveys (Yin 2003).

For the purpose of this study, an exploratory approach is adopted. The rationale behind this decision is based on the fact that the main purpose of the research is to explore the effect of stakeholder integration on innovation effectiveness and the dynamics that take place in the project context. The study intends to test the conceptual framework that is developed from the theory and to validate the final model through analyzing the links between the model constructs. Yin (2003) explains that case studies can either be a single case or multiple cases and it is according to the scope and purpose of the study that one chooses between them. Yin (2003) mentioned that it is appropriate to use a single case study if the case is uncommon, rare and critical. However, multiple case studies are used to establish more evidence about an issue and to be able to generalize it. This is done through 'pattern matching' where the pattern of actual values of dependent variables versus independent variables is compared to those predicted through theory. This type of case studies is more predominant regardless of the fact that they are also more expensive and time-consuming to conduct. This research implements a multiple case study approach to develop more compelling evidence and analytical generalizations by studying the same phenomenon in different projects and therefore achieve the validation of the conceptual framework (Mayring 2007)

Stake (1995) mentioned that in a case study the interpreter is placed in the field, observing, socializing and recording 'objectively' what is happening and at the same time examining the meanings of the interpretation and refining or substantiating those meanings. The initial research questions can be altered or refined in mid-study by the researcher if the initial questions are not working and new issues become obvious, this is called 'progressive focusing' (Stake 1995).

The choice of cases is based on two basic rationalities: literal replication and theoretical replication. Literal replication forecasts the same results whereas theoretical replication forecasts different results that need to be explained reasonably (Yin 2003). This study will adopt a literal replication logic since our project goals involve understanding an identical phenomenon in different projects. According to

Yin (2003), the unit of analysis in the case study determines whether it is embedded or holistic. If the case study examines the organisation, individuals and/or the interlinked units in between, then it is embedded. If, however, the case study conceptualizes the organization as a whole then it is a holistic one. This research study is embedded since it does not choose to study the project as a whole but rather the individuals that work for a project internally and the stakeholder involved internally and externally, which makes it more complex.

In summary, this research aims to evaluate the effect of leadership for innovation, stakeholder integration, and team identity on the effectiveness of the innovation in an open innovation construction project context. Therefore, a case study approach has been selected as the most appropriate method for the current study for a number of reasons. First, the research questions are oriented towards an exploratory approach. Second, the dynamics of stakeholders and innovation team and the project context are highly inseparable. Third, the use of interviews and observations would add strength and enrichment to the conclusions as the researcher can immerse herself in the project context, observe and record observations. Finally, the multiple case study approach has the potential to develop more compelling evidence and analytical generalizations by studying the same phenomenon within different projects. The next section further justifies the appropriateness of the use case study methods by appraising other similar research studies that have utilized a similar approach and method.

4.2.2 Previous related studies that have adopted a case study method:

Many of the researchers in the stakeholder and innovation field have utilized a case study method in their qualitative researches due to its interpretative nature.

Olander & Landin (2005) for example based their research on two case studies. Two construction projects were chosen; a housing project and a railroad project in Sweden. The two case studies were different in their size and nature reducing the ability to generalize the findings. They were selected to examine how managing stakeholders influences the 'implementation' of the projects. The case study analysis was initiated by a full understanding of the nature of each project through gathering information by means of semi-open interviews, official documents and investigations, and articles from newspapers. Then the stakeholders where identified and the dynamics, challenges, benefits of these stakeholders in each phase of the project was described in a story telling manner. The consequences of the influence of stakeholders in each phase were then described and analyzed through a power-interest matrix. The researchers used an interpretive qualitative/inductive approach where they gathered data about the case studies, proposed a tool to analyze them, developed new findings and based on that built a hypothesis to be further tested. Their method arrived at sound conclusions and generated a well-established hypothesis that opens doors for other researchers to substantiate the proposed tool and to explore the stakeholder theory in more detail.

Aaltonen (2011) on the other hand, used a multiple case study qualitative approach to conduct his research on identifying external stakeholders by examining the interpretation processes. The study was based on using Daft and Weick's (1984) typology about organizational interpretation modes in a stakeholder context. He justified his choice of case studies as a methodology as the best to answer the 'how' type of questions he wants to address which require a detailed understanding of the social processes in the organization. He added that case studies offer rich data that reflects its context. The selection of cases was based on theoretical sampling. Highly complex, uncertain and demanding international projects were selected. The projects based organizations were all different in nature to allow the revealing of differences in the environmental interpretation process to encompass different theoretical categories in Daft and Weick (1984) framework. Twenty two semi-structured interviews were used for data collection to capture the issue from interviewees' perspectives and to understand why and how they held these perspectives. The findings of the research add to stakeholder theory and strengthens it empirically supporting Daft and Weick's (1984) proposed framework by expanding it to fit and elaborate stakeholder theory.

Aaltonen et al. (2008) conducted an empirical case study to study stakeholders' strategies in determining their salience attributes at a project level. The case is a pulp mill construction project referred to as (Botnia) in Uruguay. It is a global project that faced a lot of challenges for stakeholders. His research followed a positivist approach where a hypothesis was the motive for collecting data to be analyzed and then either supporting or falsifying it. The hypothesis is: "the groups who opposed the project would be the ones attempting to receive management attention to their requests" (Aaltonen et al. 2008, pp. 511). Public sources, periodicals, webpages of the case study and the stakeholders were used to derive information and collect data about the case. The results were discussed with Botnia representatives to validate the research study. The first step of the research was gathering information to become familiar with the case and the second step was producing the analytical, chronological frame of the different projects events. The information was represented according to the time of the event in a story telling manner. A time line of the important incidents was then formed to allow and clarify comparisons. A dynamic stakeholder map was also formed at a later stage which led to the identification of the important actor. By using an existing tool which is Mitchell et al.'s (1997) stakeholder classification framework to analyze the data, this research added value to the tool and strengthened it. In addition, the methodology led to the strengthening of the relevance of the study hypothesis for future research adding new information to the field and it developed the model further.

Bourne & Walker (2006) validated the argument and findings of their previous papers on stakeholder management (Bourne & Walker 2005) through two case studies in Australia. A construction project and an information and communications technology (ICT) business project of one organization affecting a common group. The selection of these case studies facilitated the comparison of two projects within one organization and similar stakeholders and validated the assumption that every project is unique even when executed in the same working environment and with the same stakeholders. The application of the method also resulted in the confirmation of the validation of a tool proposed by Bourne & Walker which is the Stakeholder Circle™.

In 2008, Olander & Landin used two case studies to conduct a comparative analysis of the factors affecting the stakeholder management process from a project implementation perspective. The cases were two railway projects in Sweden with common features; both had the same project owner, followed the same national rules and regulations, and were based in city centres with dense populations. The choice of case studies here allowed theoretical comparisons and the gaining of an in-depth understanding of the issue in its real-life context. The approach was interpretive and inductive where Olander & Landin gathered information to build a hypothesis. They gathered data through semi-structured, open-ended interviews where interviewees were asked basic questions in an attempt to make them discuss the issues freely without constraint. In addition, internal project documents, public documents and report were also examined. The results show that even though the nature and settings of both case studies are similar, the outcomes for managing stakeholders are different emphasizing the fact that theoretical frameworks require detailed in-depth empirical studies to validate and generate new hypotheses about them.

These studies further support the choice of a case study method to gather information about stakeholder integration situated in an innovative project context. The dynamics of stakeholders, the project managers and team member are too complex to only look at them subjectively. They require in-depth understanding through observations and dialogue.

4.3 Research design

Research design can be considered as a blueprint for meeting the research objective. It assists in providing a logic that links data to the initial research questions while effectively controlling the variance (Mohamed 2004). It generally consists of a series of rational decision making choices made by the researcher considering the research questions, the setting of the study, the time horizon and the chosen unit of analysis (Cavana et al. 2001). In addition to that, it draws attention to decisions regarding the type of sample, the methods of data collection, the measurement of variables, and the analysis method (Cavana et al. 2001).

Figure (4-1) illustrates the research activities that were designed to achieve the objectives of this research. First, a thorough review of the literature was undertaken to gather background knowledge and identify research gaps, which led to the research questions. A conceptual model was then developed after a detailed review of the literature to answer the research questions. The constructs and variables of the model were clearly identified and operationalized. Three case studies were identified and interview questions were developed assisted by the operationalization of the conceptual model constructs. Observation and secondary documents were meant to compliment the information gained from the interviews. Following this stage, data analysis was undertaken on the developed conceptual model. The analysis of the first case study assisted with the refining of the conceptual model, then the other two cases were conducted with the purpose of validating it. Through qualitatively validating the identified relationships and uncovering the real issues underpinning them, the findings from the study were addressed and the conclusions drawn. These final outcomes helped to fulfil the final research objective, which sought to advance the knowledge base in the area of innovation management, set within the context of construction projects, as well as to provide practical implications for construction projects on how to achieve improved innovations through the effective integration of stakeholders. Finally, the limitations of this study were addressed. Future research strategies were also recommended to further enhance and extend the findings from the current study. The following sections elaborate further on each research activity, as portrayed in Figure (4-1).

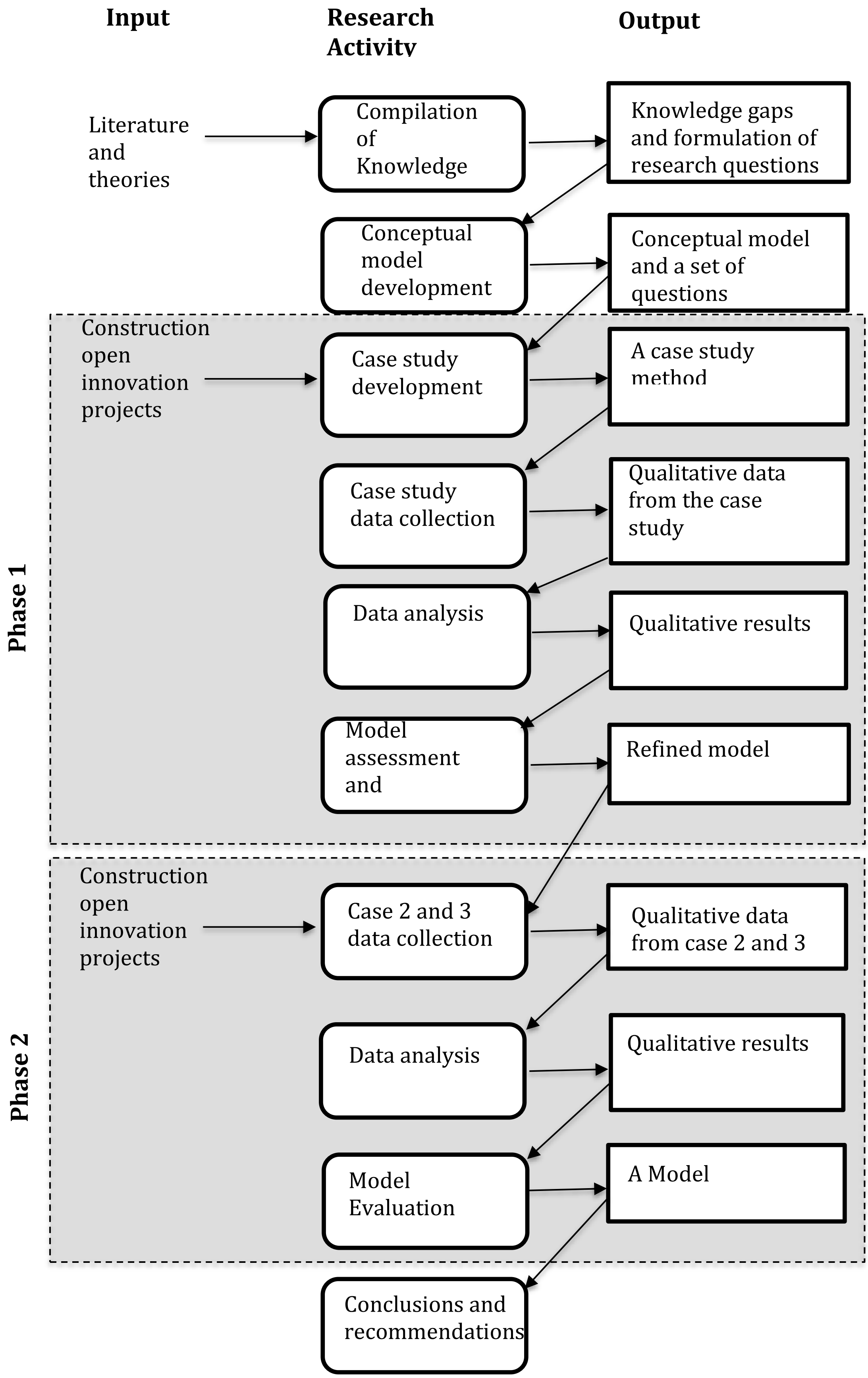


Figure 4-1: Research design

4.4 Compilation of knowledge

The main purpose of this stage was to gather the fundamental knowledge on innovation and stakeholders in construction projects. This activity was crucial in providing a comprehensive review of the existing literature. In addition to that, it opened doors for new ideas and aspects to be looked at and be considered in this research. The outcome of this activity resulted in a comprehensive understanding of the concepts that are studied in this research, which led to the establishment of a theoretical framework. Finally, the gaps and deficiencies in knowledge that were identified during the literature review, gave insights for developing the conceptual model of this research.

4.4.1 Conceptual model development

A conceptual model was developed to address the gaps in knowledge that were identified through the literature review. The model addresses the integration of stakeholders in an open innovation construction project context and its related aspects. Informed by the literature and based on some preconceived assumptions, it is proposed that innovation leaders have an effect on stakeholder integration and this in turn affects the innovation team's identity, which leads to influencing the effectiveness of the innovation. Thus, the main constructs of the model are: leadership for innovation, stakeholder integration, team identity, and innovation effectiveness. The relationship between these constructs will be assessed through the qualitative method that this research has adopted.

Each construct was then operationalized so that it could be reliably and accurately measured. Following this stage, the developed conceptual model and associated links were assessed and validated through a qualitative case study method. The details of the data collection and analysis are presented in the following sections.

4.4.2 Case study development

As explained in section (4.2), this research adopts an exploratory case study method to qualitatively understand the relationship between the model constructs and validate the conceptual model. It implements a multiple case study approach to develop more compelling evidence by analysing the same phenomenon in different projects and therefore achieve the validation of the conceptual framework. The cases selected for this research are three construction projects that have introduced design/product innovations to deliver environmentally sustainable buildings. The cases selected for this research are three construction projects that have introduced design/product innovations to deliver environmentally sustainable buildings. The design/product innovation in the context of this research can be a single sustainable design/product, which is novel to those involved in the project, or the use of multiple design/products to produce a sustainable project. This choice is consistent with Zaltman et al.'s (1973) definition of innovation as "an idea, practice or material artefact perceived to be new by the relevant adoption unit." This highlights two key components to deliver innovation: 1) it is novel in the eye of the beholder, and 2) it is adopted in practice. In addition to that, the cases have to have an external source of knowledge exploration and exploitation (outside the boundaries of the project primary stakeholders and supply chain) through different means, such as outsourcing R&D, partnering, join venture, spinoffs etc. to fit the criteria of open innovation. To study the innovation outcome, this research is not concerned about measuring success factors or performance but rather the effect of leadership, stakeholder integration and team identity on the overall perception and willingness to open the innovation process and support the innovation internally within the boundaries of the projects stakeholders. Therefore, it will follow a similar approach to that proposed by Sawang et al. (2007) and Rese and Baier (2012) by examining innovation effectiveness through studying the innovation outcome as the project is progressing and through the perception of the different stakeholders involved throughout the project lifecycle.

The sample selection supports the purpose of the research where literal replication was targeted in order to predict similar results and understand similar dynamics in innovative sustainable projects. To achieve this case design only declared sustainable innovation projects were selected. This was ensured through assessing their declarations in their websites, official statements, news articles, and a direct question to the management of the project. Accordingly, the rationale for choosing the cases was: 1. The project is a construction project, 2. The project introduces at least one innovation that would enhance the sustainability of the finished structure/building, 3. The project involves internal and external stakeholders, and 4. The project is private or semi-private.

The rationale behind choosing private projects are (1) avoid the restrictiveness of getting access to individuals and information that exsists in public projects (2) the expectation of public sector managers to be more empowered to deal with stakeholders (3) the interference of politics is less present in private projects (4) private and semi-private construction projects are more dominant in the city necessitating closer evaluation.

4.4.3 Data collection methods

In qualitative interpretative studies, it is fundamental to collect rich and adequate data to comprehensively understand the issue under investigation. Case studies usually combine a number of data collection methods. For validation purposes, the case study must have a different set of sources of evidence that can either be documentation, archival records, interviews, focus groups, observations, and physical artefacts (Yin 2003). This study will rely on interviews, observations and documentation.

A database for the case studies will be created that includes:

- Basic information about the projects
- The number of interviews
- The sampling frame providing details about the demographics of the interviewees
- The interview transcripts and the documents used to obtain additional information on the projects.

4.4.3.1 Interviews

Interviewing is a very helpful method to learn about how people understand an issue or a problem through conversations and interactions. Through interviews, researchers can learn a lot about the experiences, feelings, attitudes, and the environment of the interviewees (Kvale & Brinkmann 2009). It might seem easy to make a conversation with people, however, when the purpose of this conversation is to build a theory or contradict one, to develop a hypothesis or to question one, it becomes very critical to master the craft of interviewing and understand all of its dimensions.

For the purpose of this research 38 face-to-face semi-structured interviews that lasted around 45 minutes were conducted in each case. Face-to-face interviews allowed for the clarification of ambiguous questions and the observation and notification of facial and body language that can lead to some hidden conclusions (Stake 1995). The use of semi-structured interview methods supported flexibility and modifying each interview to suit the individual where the individual has control over the flow and content of the interview (Nicholson & Kiel 2007).

An interview guide that contained a list of questions to be asked during the interview was developed to ensure the consistency of the data (Appendix 3). It assists with maintaining the direction of the interview while investigating the issues of interest. Therefore, the interviews were designed to maintain enough structure to cover relevant information, but also supported open discussion with interviewees so that they could express their views and ideas without unnecessary constraints. In addition, demographic information of the participants was recorded to ensure the suitability of the participants for data collection (Appendix 4).

The selection of participants is guided by the objective of the study, which is usually the case in qualitative studies. Purposive sampling is undertaken to select the participants according to the criteria of the research questions, hence, stakeholders, innovation team members and managers were selected as a sample.

The sample of the interviewees includes:

- The innovation leaders (innovation champions and top managers with direct interactions with stakeholders)
- Stakeholders (consultants, design team, contractors, subcontractors, suppliers)

- Innovation team members

All of the participants that were selected were the ones with direct influence on the innovation with the intention of achieving more reliable results for the research objective. The stakeholders that were selected were the ones with significant influence on the innovation such as the consultants, design team, contractors, subcontractors, and some suppliers. Since the most influential stakeholders vary for each project, snowball sampling was used. Local authorities were not investigated in this research as they follow specific procedures and are not directly dealing with the innovation. Due to constraints of time and access their influence was assessed based on the accounts of other stakeholders.

This initial sampling was a starting point for subsequent theoretical sampling. The initial data relied on tentative research ideas, however, once data was collected and analysed, the questions were refined and other stages of data collection were performed relying on a clearer and more defined logic. According to Charmaz (2007) theoretical sampling reflects the population distribution, seeks out negative cases and achieves data saturation. It allows the researcher to collect data to develop the emerging concepts or theories and elaborate and refine the categories constituting them as and when new properties emerge (Charmaz 2007).

Snowball sampling was also undertaken throughout the period of data collection. In this method, the participants used their social networks to refer the researcher on to other people who could potentially participate in or contribute to the study. This method was very useful in this study as it prompted participants to enlighten the researcher about the 'hidden stakeholders and team members'.

The questions of the interviews were developed in a way that would contribute thematically to produce the information needed and dynamically to facilitate the interview interaction. The constructs of the study were considered while developing the questions to ensure that the interviews led to the required knowledge. Two semi-structured schedules of interview questions were developed, one for the management and one for the innovation team members as each of them have a different set of roles and responsibilities and interact with different kinds of stakeholders, while keeping in mind that all of them are actually stakeholders.

The interviews were digitally recorded to ensure the coverage of all aspects discussed using an application on apple iphone named: transcribe me. The application uploads the recording to the Internet and a transcription of the recording could be purchased too. Transcribing the interviews is a very important, time consuming, lengthy process. It is very beneficial for the researchers to transcribe their own interviews to include their own observations and notes in the non-verbal cues such as the manners and tones of speech of the interviewee which can be lost when a professional transcriber is employed for the task.

In addition to interviews and site visits, observation and several sources of archival data were used to collect data including:

- Project related documents like reports, policy memos and manuals.
- Articles about the projects.

The following section discusses the methods of data collection for observation and documentation.

4.4.3.2 Observation

Observation is an important data collection technique that has been utilized widely in qualitative research. According to Gall et al. (2007) observation can be useful in verifying data obtained by other means of data collection. In this study, the researcher observed the practices and interactions between the stakeholders in the three case studies through conducting six field visits for each case.

These observations provided another perspective to illuminate and understand the dynamics between the stakeholders, leaders and innovation team members. They assisted the researcher to be thoroughly embedded in the project context and environment and explore the gaps, problems and puzzles found in the interview data. In addition to that, it allowed the researcher to investigate the differences between what is said in the interviews and what actually happened in practice. This is very important as interviewees might not reveal certain practices and behaviour preferring to keep some information hidden from the researcher. This research utilized "non-participant observation" (Briggs & Coleman 2007, p. 177).

Non-participant observations were conducted in each case where the researcher observed some activities and interactions between the different stakeholders without interacting with them. This is a kind of unstructured form of observation (Merriam 1998).

Throughout the field visits, the researcher observed the interactions between the employees as well as the physical environment in each case. These observations were flexible without actual participation from the researcher's side. During the process of engaging in non-participant observations, only field notes were taken (an example of observation notes is presented in Appendix 5). Gall et al. (2007) stress on the importance of field notes when conducting a field study and advise that they should be reflective and descriptive with tangible details.

4.4.3.3 Documentation

Documents can play an important role in enriching the information about each case. According to Patton (2002) document analysis uncovers some unobservable information. In addition to that, documents assist in developing the appropriate set of questions to be asked in interviews. Documents provide general background information about each case. Case researchers often will analyze the related documents prior to conducting interviews to be able to comprehend and better understand the case context and participants and to develop the case questions. This makes the dialogue more interesting and fruitful. Thus, documents do not only provide more information for the study, but they also serve to ensure the trustworthiness of interviews and observations (Glesne 1999). The documents that were analysed in this research were:

- Project related documents like project progress reports, policy memos and manuals
- Articles.

The next section will discuss how the data were analysed to validate the conceptual model and answer the research questions.

4.5 Data analysis method

Data analysis, Goodson and Sikes's (2001) explain, means making sense of, or interpreting the data. Data interpretation is fundamental to analysing any case study. Gall et al. (2007) discuss the ways that analysis and interpretation is a feasible strategy for analysing data in qualitative research. They explain interpretational analysis as "a process of examining case study data closely in order to find constructs, themes, and patterns that can be used to describe and explain the phenomenon being studied" (p. 466). In the current study, within-case study interpretation was undertaken to explain the collected data in each case, then, a cross-case interpretation and synthesis was conducted between the three case studies (Eisenhardt 1989).

A within-case analysis generally starts with detailed case study write-ups for each case. The write-ups are often descriptive in nature; however, such descriptions are essential for generating insights about the case (Eisenhardt 1989). The information from each case is necessary for providing perceptions about the constructs as they occur within a real-life context. The next step is to code the data into categories. This study employs content analysis as a technique for coding (Zhang & Wildemuth 2009). Content analysis has been used widely in many qualitative research studies and numerous scholars have attempted to define it. Hsieh & Shannon (2005, p. 1278) for example defined content analysis as "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns." Prior to this definition, Patton (2002, p. 453) defined it as "any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings."

These definitions of qualitative content analysis help to clarify how it integrates speech, text and context in examining obvious and hidden meanings, themes and patterns within specific texts. Content analysis is a method that researchers use to understand social reality in a subjective way but presented according to principles of the social sciences. It is generally inductive in nature as themes and categories emerge from the data through a careful examination and comparison by the researcher (Zhang & Wildemuth 2009).

There are three main approaches to content analysis according to Hsieh and Shannon (2005). These approaches vary in the degree of involvement of the researcher in inductive reasoning. The first approach is the conventional qualitative content analysis, which is basically used for grounded theory development. This approach extracts the categories of coding straight from the raw data. The second approach is directed content analysis, which is very relevant to this thesis research since analysis and interpretation is used specifically to validate and extend a conceptual framework and theory. In the directed approach, initial coding begins with a theory or research findings. Then, the researchers involve themselves deeply in the data and obtain themes during data analysis. The third approach is summative content analysis, which investigates the usage of words to find meanings and themes. This approach uses inductive reasoning through an approach that might seem quantitative as it starts with the counting of words and surface content, and then extends the analysis to include latent meanings and themes.

This thesis uses the second approach to content analysis as it is commonly applied to validate the conceptual model that is developed depending on an existing theoretical background. The details of the process of content analysis are discussed further in the

Data Analysis chapter.

After conducting a within-case study analysis for each one of the three cases, an examination of cross-case patterns is conducted. This process contributes to validating the relationships of the model constructs through 'pattern matching' techniques (McCutcheon & Meredith 1993). Much of the activity of pattern matching in qualitative analyses involves attempts by the research to link two patterns, one is theoretical and the other is observable or operational. This technique is used to establish links between the collected data and the theoretical propositions by comparing the proposed patterns with the actual values of variables obtained from data collection and analysis (McCutcheon & Meredith 1993; Yin 2003). For the purposes of this study, pattern matching compared the patterns of relationships among the actual constructs to those predicted by the model. The predicted patterns were developed using high, medium and low value descriptors for the constructs, namely open innovation (OI), leadership for innovation (LS), stakeholder integration (SI), team identity (TI), and innovation effectiveness (IE). It is worth noting that the analysis aimed only to provide a gross match or mismatch between the case-based patterns and the model-predicted patterns.

Due to the large amount of narrative text that is collected in each case, computer-based tools such as NVivo (the tool that is used in this research) may assist with the coding and categorizing of information (Yin 2009). These tools will only help with data analysis and their functionality is, in many cases, analyst-driven and often requires expertise in the subject matter (Walsham 2006). The patterns and categories as well as any explanatory or descriptive theories are mainly identified and interpreted by the analyst (Yin 2009).

4.6 Trustworthiness and authenticity

Establishing the validity of qualitative research is very important to consider when conducting research. “Internal validity,” “external validity” and “reliability” are the major forms of evaluation of research inherited from the positivist tradition. In studies guided by a constructivist/constructionist interpretive epistemological orientation, “trustworthiness” and “authenticity” are usually the means deployed to judge the quality of inquiry (Guba & Lincoln 1994, p. 114). Studies within the qualitative research tradition have their own techniques for establishing validity. Eisner (1991, p. 58) states that an effective qualitative study can help us to “understand a situation that would otherwise be enigmatic or confusing.” This further exemplifies that in qualitative studies, “generating understanding” and supporting it with data is what accounts for the reliability of the study (Stenbacka 2001, p. 551).

The different purposes behind quantitative and quantitative research help to explain some of the reasons why concepts of reliability might be perceived by some researchers as irrelevant in qualitative research. According to Stenbacka, (2001) “the concept of reliability is even misleading in qualitative research. If a qualitative study is discussed with reliability as a criterion, the consequence is rather that the study is no good” (p. 552). In contrast to Stenbacka’s (2001) opinion, Patton (2001) argues that validity and reliability are two factors that qualitative researchers should consider when designing their research, analysing results and judging the quality of their work. This can be achieved through judging the quality of the study according to its own paradigm (Healy & Perry 2000). For example, Lincoln and Guba (1985, p. 300) recommend the concepts of “dependability” and “trustworthiness” in qualitative research that corresponds to "reliability" in quantitative research. Seale (1999) have since argued in favour of the ideas of dependability as an applicable concept for assessing reliability in qualitative research.

The subjectivity of much qualitative research has to be questioned since its interpretations are based primarily on experience from the researchers' perspective. Qualitative research actually emphasizes on the importance of personal engagement, relating and embedding with the participants and the research context to achieve more realistic, credible and trustworthy data. According to Goodson and Sikes (2001), personal engagement and positive relationships with participants ensures a higher quality of research. In this research for the thesis, the personal involvement of the researcher in the field revealed a lot of important information that could well have been missed if the researcher had been more detached. Reflecting on the researcher's responsiveness and empathy towards the participants, it noticeably assisted them to feel more comfortable and relaxed when they were being interviewed.

To further ensure the validity of qualitative research, the use of triangulation is one of the most common and useful methods implemented in case research. Glesne (1999) explains triangulation as "the use of multiple data collection methods, multiple sources, multiple investigators, and/or multiple theoretical perspectives" (p. 32). Triangulation is used as a strategy for improving the quality of qualitative research. Denzin (in Flick 2009) distinguishes four types of triangulation (1989b, pp. 237-241). Data triangulation refers to the use of different data sources, which should be distinguished from the use of different methods for producing data. Thus, he comes close to Glaser and Strauss's strategy of theoretical sampling. In both cases, the starting point is to involve purposively and systematically, persons, study groups, and local and temporal settings in the study. The second type is investigator triangulation. Different observers or interviewers are employed to detect or minimize biases resulting from the researcher as a person. Theory triangulation is the third type, which refers to approaching data with multiple perspectives and hypotheses in mind. The fourth type is methodological triangulation. In this approach, in most cases, researchers use different ways of collecting data. Here, it is important that triangulation does not just lead to "more of the same". Interviewing the same people twice with different methods of interviewing would not make sense rather you should seek approaches on different levels. For example, combining interviews with observation focuses on subjective knowledge and experience and allows issues of the past to be introduced in the first approach. Observation rather focuses on practices and interactions at a specific moment and thus adds a new perspective (Flick 2009).

According to Denzin & Lincoln (2003), triangulation may be used as an approach for further grounding the knowledge obtained with qualitative methods. Grounding here does not mean to assess results but to systematically extend and complete the possibilities of knowledge production. Triangulation is less a strategy for validating results and procedures than an alternative to validation, which increases scope, depth, and consistency in methodological proceedings (Flick 2009).

Different methods of triangulation are used in this research, data triangulation and methodological triangulation. Content analysis and a narrative-sequential are used as different methods of analyzing the (same interview) data. Then, a different method was used to obtain a different set of data, which is the observational data. The interview and the observation data were compared as to how far each set of data complemented and supported the other. Document analysis was also used to obtain background information about each case and create an in-depth understanding of the nature of each case, which in turn enhances our understanding of the cases. Finally, within and cross case analyses, linking all of the different sets of data in the process of the analysis in each case, and then across the three cases, enhanced the validity of the qualitative data obtained in this research.

In this study, to ensure the trustworthiness of the data, semi-structured interviews with the different stakeholders in innovation construction projects were used in addition to observation and document analysis for each case study. In addition to the use of triangulation, the researcher used the strategy of "coding checks" (Gall et al. 2007, p.475). This technique involves reading the data and modifying the categorized system to find matches amidst the interview transcripts, observations and documents. Moreover, the researcher used member checks by requesting participants to review the summary of their transcripts for accuracy and completeness. In addition to that, the researcher utilized the method of cross-case patterns analysis after conducting a within-case analysis. This process validates the conclusions drawn from the multiple-case studies through 'pattern matching' techniques (McCutcheon and Meredith 1993). Through trustworthiness and validation of data, qualitative research can produce sound conclusions and understandings of phenomena that often can only be superficially understood and analysed using quantitative measurement tools.

It is worth noting that exploratory case study research is not concerned with making generalizations about the overall population. The main concern of case study research is generating an in-depth understanding of a phenomenon rather than generalizing the research findings (Mayring 2007). Stake (1995) notes, "the real business of case study is particularization, not generalization" (p. 8). Therefore, achieving thorough conclusions and understandings about stakeholder integration and its effect on innovation effectiveness is the main objective of this research. Exploration and greater knowledge and understanding about the research problem rather than making generalization is the purpose of this study.

4.7 Ethical considerations

The nature of qualitative research is more intrusive than quantitative methods (Patton 2002). In qualitative research, the researcher is often personally involved with the participants sharing individual experiences and personal information; thus, the chance of causing potential harm to the participants is higher than in quantitative research. Therefore, the researcher developed an awareness of the concepts of "informants' rights" (Goodson & Sikes 2001, p. 90) and the ethical principle to "do no harm" (Tisdale 2004, p. 30). In this research, the following was carried out to minimize any negative consequence arising from the study:

Prior to fieldwork, consent forms were submitted to each case to attain permission (Appendix 1). In the consent form a brief description of the research is provided, the aim of the research, the number of interviewees required, the time needed to conduct each interview, the confidentiality and anonymousness of the case and the interviewees and finally, the importance of their participation to understanding the field of innovation in construction project management.

Before conducting the interviews, the interviewees were given a form that describes the interview's code of conduct and they were asked to sign the form (Appendix 2). In the code of conduct their rights were clearly articulated. They were assured about their confidentiality. They were also guaranteed that the information provided by him/her will be generalized in the final report and that all quotes will be anonymous.

They were notified that they can withdraw from the interview at any time and that they have the right not to answer any question. Therefore, their rights were discussed prior to the research. In addition to informing the interviewees about their rights, the researcher should be aware of his/her responsibility in showing professional manners and a positive attitude of mind. The researcher should also be responsible in being truthful in presenting the research without distorting or supressing relevant data. The researcher should also be aware of the risks associated with conducting the research, such as meeting strangers and visiting sites. It is advisable to avoid exchanging personal information with interviewees and to always inform another person of any arranged meetings.

Chapter 5- Description of the three cases

Introduction to Chapter

The aim of Chapter 5 is to present the cases that are used in this thesis to obtain the required information and data to study and evaluate the proposed conceptual model. In this research, three cases are analyzed, referred to as SC, AKO, and JFZ (pseudonyms are used throughout the study for participant names and places). The three cases are leading large-scale construction projects that claim to use product innovation to achieve their sustainability goals.

5.1 Case 1: SC

5.1.1 Introduction

The large-scale mixed-use residential project covers an area of 5,000,000 square feet containing 500 townhouses and courtyard villas inspired by the urban form and heritage of Dubai's old district. The project also includes an equestrian center, a community mall, a mosque, an eco-resort and spa, a country club, a sustainability school, a science museum and planetarium and a sustainability center of excellence.

The aim of the project is to provide environmentally sustainable luxury housing. The city's developers claim that it will generate much of its own electricity through city-wide and rooftop solar panels. In addition to that, the architectural designs take into consideration the natural aspects of sunlight, wind and orientation in order to create cleaner air and lower temperatures for a cooler city microclimate. Moreover, the project aims to meet the highest environmental standards by adopting a sustainable approach in its quest to become a regional leader in eco-tourism and global environmental protection.

The owner of the project, who is the developer, claims that the project as a whole is an innovation, especially in the MENA region, because it is the first of its kind to consider sustainability in every aspect of the city starting from the planning phase on to the implementation phase, and then, actually going beyond the implementation phase by building a sustainability school and a sustainability center of excellence within the city to deliver sustainability knowledge for generations to come.

5.1.2 The sustainable innovation aspect of the SC project

The owner stated that the project is consumer-based and sustainable in terms of urban design and architecture, water recycling, soil testing, electricity generation, materials, air conditioning, social wellbeing, etc. All of these aspects were brought together under the umbrella of a sustainable city through using different innovative techniques and materials to make the whole project an innovation itself.

Their initial plan was based on the vision of Sheikh Mohammed Bin Rashid, the Ruler of Dubai, to make the UAE among the best countries in the world by the time of the Golden Jubilee of the union. This in turn led to the initiation of the idea of developing a sustainable city in Dubai by elaborating on three pillars of sustainability through the application of smart information and communication technologies (ICT). After brainstorming, a strategy was developed then elaborated through the utilization of two aspects, innovation and sustainable measures. The strategy was based on the engagement of a number of stakeholders,

- Local government and authorities
- Research and academia
- Owners/tenants/investors
- Private stakeholders
- Non-profit organizations
- Local communities

The innovations were also considered under the umbrella of the three pillars of sustainability. A strategy to sustain these innovations was also planned to improve the existing sustainable solutions and to monitor the social, environmental and economic performance.

5.1.3 The SC project leadership

What facilitated the idea of building a sustainable city in Dubai along with the ruler's vision and the collaboration with internal and external stakeholders were the vision and the characteristics of the innovation leader, who is the owner in the case of SC, as claimed by many employees and as observed by the many field visits conducted by the researcher.

FS, the projects idea generator and owner, is the developer of the project, an enthusiastic leader with a very focused long-term vision. His partner, W, is the cofounder and childhood friend who holds the same vision and interest. Having a civil engineering background and substantial experience as developers allowed both founders to know the arising market demands and the need for sustainable development, especially in a city where building and construction is taking place at a very high rate. Learning from previous practices globally, studying existing projects, communicating and dealing with universities and current research, the founders believed that the idea of building a sustainable city with Net-ZERO buildings is doable. They pursued their goal by hiring innovative people to develop the project's initial plan in addition to consulting people with some experience in the field from global cities that are well known for sustainability. They also hired freshmen from local universities because they believed that young people have different and unique ideas that some experienced people might neglect. The owners believed in the importance of hiring people with a passion for innovation and sustainable development at the same time they wanted to create an environment that supports and motivates the creation of new ideas.

The bond between the leaders and the team was obviously strong and respectful. FS knew all of the innovation team members by their names and has introduced them in a very compassionate manner. FS and W also insisted on the importance of the right delivery of their ideas to the different stakeholders because misunderstanding is a major obstacle to the initiation and the development of new innovation as they claim. They said that they paid special attention to the stakeholders and contemplated their importance and power carefully to facilitate the diffusion of the innovation.

5.1.4 The SC project and open innovation

To facilitate the vision and the sustainable goal of the SC project, the owner believed in open sources of innovation input. FS stated that the idea was born because of his vision about the future and the need to sustain life in general; therefore, he discussed his idea with his partner W. They consulted two international universities and two consulting companies that have famous names. According to FS, they have benefited a lot from the exchange of knowledge with the universities but the consulting companies did not impress them. So they developed the feasibility study and the initial plan in-house in their own company. Then they decided to contact local universities and benefit from the ideas of interns and students. After a couple of sessions with the universities, they hired 3 freshmen to help with the development of the sketches and designs. The ideas of the employees where always welcomed. FS encouraged his employees to share their ideas after analysing and studying them during his regular weekly meetings with the team.

They have also performed market research to check the needs of the customers to develop the project according to their demands. FS stressed on the idea that his sustainable project does not only end when the project is transferred to customers but it continues by embedding sustainability in people's lifestyles and through educating children about living sustainably in the project's sustainable school. Therefore, it is rather important to communicate this idea to customers and this would not be easy without studying customer demands and needs ahead of time.

The open source of innovation was not only present at the concept and planning phases of the project but also at the execution phase. For example, the main contractor, ES, stated that he was always looking for new and innovative materials in his travels and business trips to support the sustainable innovation aspect of the city. He showed a strong sense of commitment towards implementing state of the art materials and equipment in the project. In addition to that, he mentioned that he has created a chat group with his team and they keep sharing photos and information on interesting innovations that they think is good for the project.

5.1.5 The SC project and stakeholders

After the finalization of phase 1 which is basically identifying the need and developing the concept and its feasibility, the project team members where clearly identified; consisting of the CEO and his VP, a CFO, a COO, the design team (manager, 3 architects and 2 civil engineers, 1 environmental engineer), a commercial manager and a number of sales personnel, and a CRM manager.

The team developed the plan, the feasibility studies, the sketches and drawings, best practices and external studies, selected equipment, negotiated with authorities, assessed risks and alternatives, reconfirmed economics and at the end developed a project brief. This process required a great amount of effort in negotiating with the different stakeholders involved. The main difficulty according to FS was raising the standards to be innovative and delivering their innovative ideas to the different stakeholders in a language that they can understand. During this phase the team dealt with a number of stakeholders such as:

- Authorities:
    - Dubai Land
    - DEWA
    - RTA
    - Civil Defence
    - Dubai Municipality
    - Emirates Environmental Agency
- Customers
- Universities

- Contractors
- Consultants
- Investors

Mr FS partnered with universities by outsourcing research to enhance the knowledge base to develop the innovation. In addition, he discussed the idea with potential interested customers and issued a survey to understand the interests of potential customers which is not commonly performed in large construction projects.

FS clarified that their concept was new to many stakeholders; thus, he had to ensure that they clearly understand it through various discussions and seminars. Once they understood the concept, some of them supported, encouraged and provided some insights on the overall idea of the project, whereas others found it not viable and very risky. Many negotiations happened at this stage to bring all of the stakeholders to an agreement. While this happened, FS was very thorough in identifying the different types of stakeholders, their importance, their power and influence and sought to deal with them all appropriately. The benefit that FS had was the strong relationship and mutual benefits he held with many stakeholders. For example, the environmental consulting company is a sister company to SC, the contractor has family relations with FS, some shareholders are old friends of FS or W in addition to the good relationship with many people in the different authorities.

In phase 3, they were involved with contractors, subcontractors, and suppliers. The project was moving towards the end of phase 3 when the interviews and field visits were performed. The major stakeholders that have influenced the project are illustrated in Table 5-1. The innovation team are the stakeholders that have a direct influence on the development of the innovation. The table shows that stakeholders that were not part of the innovation team in phase 1 became part of it in the other two phases such as consultants and contractors. The table also shows the integration of stakeholders at the different phases of the project. For instance, it is not common to see customers and universities at phase 1 of such projects as well as contactors and media in phase 2. This research will further study this integration in the following chapters and will provide insights on how the change in the normal pattern of integration influences the innovation team and the overall effectiveness of the project. The project was at phase 3 when the data collection was performed therefore, the transfer phase (phase 4) was excluded.

Table 5-1: The major stakeholders in each phase of the SC project

Phase 1 (Concept)	Phase 2 (Plan)	Phase 3 (execute)
Innovation team - Owner (Innovation leader) - VP - Designers - Universities Consultants Customers (End users) Potential Investors	Innovation team - Owner (Innovation leader) - VP - CFO - COO - Design team - Universities - Consultants - Contactors Shareholders Authorities Customers (End users) Media Financial institutions	Innovation team - Owner (Innovation leader) - VP - CFO - COO - Design team - Consultants - Contactors - On-site project director (client/developer side) - On-site project director (contractor side) Authorities Customers (End users) Financial institutions Suppliers Subcontractors

Figure 5-1 further illustrates the major stakeholders that had an influence on the project while demonstrating the internal and external stakeholders that were part of the innovation team. The owner, VP, CFO, COO and the design team were internal stakeholders and were the developers at the same time. Universities, customers, consultants and contactors were external stakeholders that were part of the innovation team in the case of the SC project. The innovation team members were emphasized here to distinguish them from the rest of stakeholders, as they were a major study group in this thesis. It is worthwhile to note that all of these stakeholders had direct and indirect links between each other and they all had direct links with the innovation team.

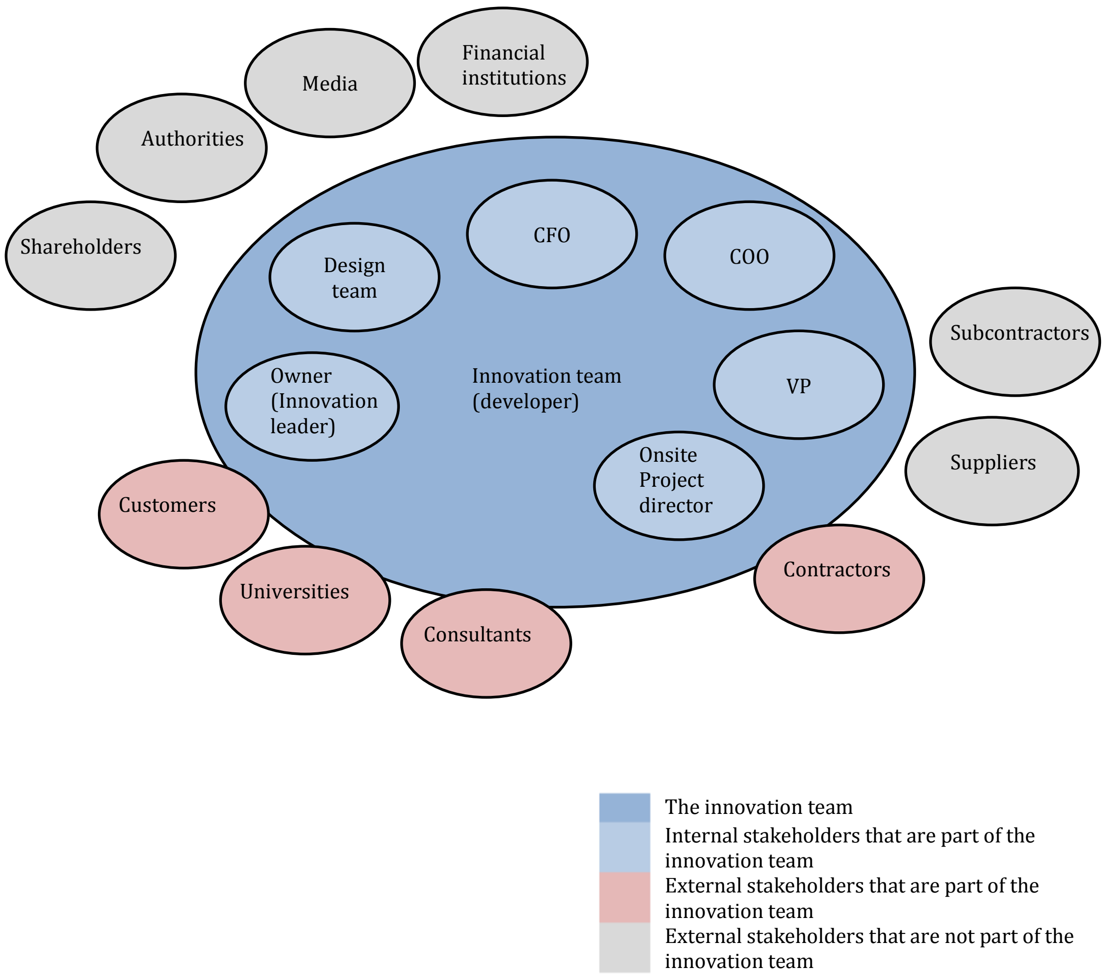


Figure 5-1: Internal and external stakeholders in the SC case

5.1.6 The SC project team

Since the project as a whole was an innovation, the innovation team were mainly the team members that were key to developing the project starting from the concept phase on to the planning and execution phases. The members that had a direct influence on the sustainable innovation of the project were the ones that are considered the innovation team members. As shown in Figure 5-1 in the previous section, it consists of the owner FS, the VP W, the COO, the CFO, the design team, universities, consultants and contractors all along with their own teams.

As mentioned earlier, FS showed passion and commitment towards the project and was very compassionate about the team that are bringing it to life. At the same time, the team showed attachment and passion towards the project. While talking with them, many mentioned that the project was "their baby" they took care of it since it was conceived and they want to see it grow and succeed. One of the team members was actually postponing her change of location to another country to see the project delivered. She thought that it would be one of her proudest moments in life. Many others of her colleagues felt as compassionate and proud about the project as she was. The sense of belonging and attachment was very obvious among the team members.

The team showed interdependence among each other, every one's job was important and complemented the other. However, when some junior employees that report to the contractor where interviewed, they complained about the harshness of their managers and the difficulty in dealing with the subcontractors that usually causes persistent problems, but at the same time they mentioned that the weekly meetings with the project manager resolves many of these difficulties. They also noted that whenever there was a particularly stubborn problem, FS intervened and resolved them. This drew the researcher's attention to understanding the reasons behind this harmony between the team members and identify whether the integration of the various stakeholders facilitated the development of a sense of team identity in the project. This complex issue is reflected upon and discussed in the following chapters.

5.1.7 Innovation effectiveness

FS stated that the effectiveness of his project according to him was to prove that building a sustainable city is commercially viable. He also noted that he would consider the innovation effective only if he witnesses a change in the residents' behaviour and attitude towards sustainability.

The team members mentioned that it is important to deliver the innovation within budget and timeframe but they also mentioned that it was not the only target in the case of SC. Given that the project targets social, environmental and economic aspects, they would not consider it effective unless they meet their clearly defined objectives in these three pillars of sustainability. So far, the project has achieved most of its environmental and economic objectives but the social objectives will only become clear after the delivery of the project.

5.1.8 Case 1 summary

The SC project as a whole is an innovative project as it is one of its kind in the MENA region and across many countries in the world. The project aims to provide a luxury housing environment while following sustainability standards. The main interest of this case research is to study the relationship between the leader FS, the integration of internal and external stakeholders, and the innovation team to determine their influence on each other and the influence on the identity of the innovation team, and finally, to conclude if there is an influence on the effectiveness of the innovation.

The SC project status is active and progressing positively, the leadership style and behaviour are very positive and the relationship between the team members themselves and between them and their leader was very good. There were some challenges when dealing with stakeholders, nevertheless the leader usually presents very thoughtful solutions developed with the assistance of his team. There were also some challenges among the team members but they were usually resolved quickly in the weekly meetings and through good communication channels as described by some employees. Some stakeholders such as universities, customers, contractors and media were integrated at early stages of the project, which is not common practice in many construction projects. The project showed effectiveness in terms of budget, schedule and the environmental aspects. The social effectiveness of the project will be determined a year after the completion of the project.

5.2 Case 2: AKO

5.2.1 Introduction

AKO is a large-scale mixed-use residential development that covers over 55 million square feet containing energy-efficient homes surrounded by lush greenery and cascading water features. The project also includes an 18-hole championship golf course, a luxury spa that is inspired by the desert, over 2,000 hotel apartments of varying size, nurseries and schools, and a community mall. The project claims that it will offer cleaner air, naturally cooler temperatures and a carefully designed master plan and road network system to reduce pollution, with dedicated spaces for bicycles and hybrids. The project aims to build the community in an architectural design that harmonizes nature with buildings to provide an attractive and sustainable environment in addition to using energy efficient materials, air conditioning, lighting and controls along with low-emission paints and solar water heating systems.

The project markets itself through the high-class world golf club that it encompasses. It is a premium 18-hole championship golf course complemented by an expansive pro shop, world-class restaurant and clubhouse facilities. The project also includes a tropical rainforest, which is a living, breathing ecosystem, where fresh rainfall nourishes the diverse range of plants and trees every day housed within a sky dome. Varieties of tropical birds will be introduced as well. To add to its environmental sustainability aspect, the project provides its very own organic fresh market where residents can buy and sell the freshest fruits and vegetables. The backyards of the villas provide room to grow a variety of vegetables and beans.

A well-known private development company that has many large-scale developments in Dubai owns the project. The EVP (Executive Vice President) of the AKO project, BM, was hired specifically for this project. While the development company emphasizes that the city is innovative and sustainable, BM did not really believe so. He thought that there are specific areas that are innovative in terms of sustainability but the whole project cannot genuinely be considered to be a sustainable innovation, nevertheless, the project satisfies all of the green building regulations and specifications developed by Dubai Municipality (DM), Dubai Electricity and Water Authority (Dewa) and the Government of Dubai (DGov). BM even mentioned that his project is not comparable to the SC project (Case 1) where they have really considered sustainable innovations in every aspect in the city.

5.2.2 The sustainable innovation aspect of the AKO project

The development company that owns AKO was reputed for its large-scale multi-billion projects along with their high-rise buildings that cover the skies of the city. It was a well-known that the company is driven by profit-making and had not produced many sustainable projects prior to AKO. What actually derived the idea of making AKO a sustainable project was the pressure from the city officials to make the city one of the top 10 sustainable cities by 2020. All new projects that started in 2014, including AKO, had to implement the Green Buildings Regulations and specifications that were introduced in 2010 by Dubai Municipality. This encouraged them to develop the idea further and consider some innovative ideas to make their project more appealing to the public.

BM thought that the main sustainable innovation aspect of the project was in the architectural designs of the project and in providing embedded vast greenery areas surrounding the residential areas, which was not very common in the region. The golf course that was embedded in the community was also another new aspect that was unique in late 2016. Consequently, these particular aspects were attended to while conducting the interviews and were specifically highlighted in this case study.

The architectural designs considered the issues that are appropriate for the region. Trying to maximize the circulation of wind and minimize direct sunlight to reduce heat in a very hot and dry climate was a very important sustainable issue for the design, from their point of view. Therefore, at the early stages of the design, the orientations of the facades in the villas were specifically considered. Later on, the designers developed a different idea of adding varying levels of edges to the villa to maximize the shaded areas and make it easier to cool the villas while reducing the consumption of electricity by using air conditioners. After that, they further developed the design by considering the orientation of a whole cluster of villas. They divided the villas into different clusters, each cluster was oriented in a way that maximizes the shaded areas and wind distribution and reduces direct sunlight, producing different categories of villas with unique curved shapes.

The other innovation that BM pointed out was embedding the golf course and vast green areas within the residential area. This in their opinion could provide the development with better air quality through raising the production of O_2 and reducing CO_2 levels. The likely excessive amount of water needed for such a facility may prove to be a major challenge requiring innovation to reduce water usage and waste. BM was hesitant in saying that he was also not very convinced with the concept but the owner of the development property encouraged it perhaps because of the marketing advantage it could deliver. Having a very good education and background in sustainability; BM tried to overcome this problem through generating innovative ideas to reduce water consumption. Based on research, they advanced the idea of underground water irrigation. The land that the golf course was developed on had a good reservoir of underground water at a reasonable depth that could be used to irrigate the green areas in the development. BM tried to adopt the idea but it did not really gain sufficient attention of the project's management and stakeholders and became forgotten within the daily routine of work.

5.2.3 The AKO project leadership

BM, the project's EVP and leader, is a highly experienced man with a solid background in construction management and finance who was also very passionate about sustainability and the improvement of people's quality of life. BM reported to the owner of the project, S, a very well-known man in the business and real estate world in Dubai. S was a very busy man that owned several large-scale multi-billion projects. Due to his demanding work schedule, he only interfered when there were big decisions, mainly financial, to be made about the project; therefore, he was very selective when he hired BM.

With more than twenty-five years of experience in managing construction projects and their financial aspects, BM knew his role and duties well. He was educated in the US and spent most of his professional life working there, therefore, an obvious cultural influence was apparent when he was interviewed despite the fact that he has Arabic origins. He has very developed management and communication skills and was acutely aware of the importance of the stakeholders he deals with. However, the cultural difference between the US and Dubai made it a little harder for him to adopt the skills that were required to deal with stakeholders in this part of the world. He was somewhat negative about the long processes and the time it required to get approvals in different authorities. He complained about the effort it took to convince stakeholders to adopt specific ideas and innovations. The fact that he did not have previous relationships or bonds with any authorities and important stakeholders in the region slowed down the process of getting approvals, establishing mutual interests and achieving agreements.

His relationship with the team was relatively good but there was evidence that there was a sense of hierarchy between the different employees in the project. Although some junior level employees' offices were next door to BM's office, they did not appear to engage in any kind of friendly chats or interactions with him. A sense of segregation was felt when I was observing them working in their central office. So, there was an obvious communication issue with the leader. In terms of innovations, BM had many innovative ideas in his mind but he found it difficult to persuade the owner and the investors to adopt these ideas because they required implementing existing foreign innovations that can be very expensive.

5.2.4 The AKO project and open innovation

To facilitate the generation of sustainable innovations in the project, the AKO team (BM and the design team) realized the necessity for open sources of design input. At the beginning of the planning phase, BM along with the design team, which was in-house at this stage, have worked on developing a number of different plans to identify their best option after performing the necessary market research. They basically relied on their previous experiences of developing mega projects. They have previously developed a similar project but without considering sustainability perspectives, therefore, in their opinion, all what they needed to do was to add the sustainability aspect to their previous practices of developing large-scale residential projects.

Afterwards, they hired a well-known consulting company (ACM) because they knew the authorities' specific requirements especially in terms of green buildings and this subcontracting would save them time. ACM provided them with many technical details that they sometimes approved and sometimes rejected. They also partnered with a third party solutions company (SUS) to provide them with solutions to create energy and water efficient facilities through their expertise in green building design, materials and energy efficient technologies as well as to make sure that they obtained the LEED and Estidama certifications for sustainable developments.

Another important partner in the project was the golf course operator organization (TR) and a famous and iconic sportsmen company (TW) who bought his design expertise and worldwide playing experience to the development. They believed that partnering with such global and famous organizations would make their development a market leader in luxury real estate. All of these different parties worked together to produce a master plan that located the golf course within the architecturally innovative clusters of residential areas to produce a sustainable master plan of the project.

5.2.5 The AKO project and stakeholders

After the finalization of phase1, which consisted of identifying the need and developing the concept and its feasibility, the project team members where identified comprising the EVP, the SVP technical, a CFO, a COO, the design team (design manager, lead architect, architects, civil engineers, environmental engineers, mechanical engineers), a commercial manager, and a CRM all along with their own teams.

The long process of phase 1 and 2 required massive efforts in negotiating with the stakeholders involved to produce the finalized project brief. The main difficulty according to BM was educating investors about the innovative ideas in the project because they were usually economically driven. If the idea could make a profit, they became interested, but the sustainable innovations that they were usually negotiating on were not profit making and required new technologies that the investors felt were risky.

The golf course was already accepted as a start-up idea of the owner's so it did not face difficulties to be approved, however, the technological solutions to irrigating the grass did not receive attention or support. The architectural innovations were often approved only after several meeting discussions and debates. The Technical SVP referred to them as very stressful and time-consuming negotiating tasks due to the size of the project and the many clusters of the residential areas. During this phase the team dealt with a number of stakeholders such as:

- Authorities:
    - Dubai Land
    - DEWA
    - RTA
    - Civil Defence
    - Dubai Municipality
    - Emirates Environmental Agency
- Consultants
- Partners
- Shareholders

BM was mainly responsible for attracting investors and negotiating with shareholders, which was a tough task. He mentioned that the financial motivation behind the project made it very difficult to deliver new ideas because stakeholders and investors often associated them with additional risk. Consequently, he had to prepare well for the different opinions that he might receive in the board meetings to convince them of his plans. He also found it challenging to deal with many authorities partly due to the cultural differences from his experience of working in the US compared to Dubai. This encouraged him and his team to hire the consultant company (ACM) that was specifically chosen because of their strong bonds with the authorities and ability to secure the approvals in a minimum period of time. Numerous negotiations took place at phase 1 and 2 to bring all stakeholders to an agreement. Nonetheless, many innovative ideas where not approved by the different stakeholders and were not diffused and adopted in the project.

In phase 3, AKO were involved with contractors, subcontractors and suppliers. On site, there was a project director that was part of the innovation team who managed the different project managers that are assigned to each cluster of houses. He was the link between head office and the on-site offices. Among his many responsibilities was the delivery of the project on time, managing the day-to-day working schedules, evaluating materials, explaining the work ethics and activities to project managers who report to him and to stakeholders, maintaining and updating project reporting, checkpoints and financial reports, ensuring that the different stakeholders were meeting their requirements and resolving conflicts that arose among them, and finally, developing contacts with the innovation team members. The project managers likewise faced a lot of challenges including resolving the conflicts that usually happen between the contactors, subcontractors and suppliers. It was their responsibility to ensure the delivery of their part of the project on time regardless of the issues and uncertainties that they might face throughout the execution phase.

The project was moving towards the end of phase 3 when the interviews and field visits were performed. The major stakeholders that have influenced the project are listed in Table 5-2. The table also shows the integration of stakeholders at the different phases of the project. The project was at phase 3 when the data collection was performed therefore, the transfer phase (phase 4) was excluded.

Table 5-2: The major stakeholders in each phase of the AKO project

Phase 1 (Concept)	Phase 2 (Plan)	Phase 3 (Execute)
Innovation team - EVP (Innovation leader) - SVP technical - Designers Consultants Authorities Potential Partners Developer (Owner)	Innovation team - EVP (Innovation leader) - SVP technical - CFO - COO - Design team - Consultants Shareholders Authorities Media Financial institutions Developer (Owner)	Innovation team - EVP (Innovation leader) - SVP technical - CFO - COO - Design team - Consultants - Contactors - On-site project director (developer/client side) - Project director (contractor side) Shareholders Authorities Financial institutions Suppliers Subcontractors Developer (Owner) Media

Figure 5-2 further illustrates the major stakeholders that had an influence on the project while demonstrating the internal and external stakeholders that were part of the innovation team. The owner, EVP, SVP technical, CFO, COO, on-site project director, and the design team were internal stakeholders and also were the developers at the same time. Partners, contractors and consultants were external stakeholders that were part of the innovation team in the case of the AKO project.

Figure 5-2: Internal and external stakeholders in the AKO case

5.2.6 The AKO project team

The members that had a direct influence on the development of the sustainable innovation of the project were the ones that are considered the innovation team members. Due to the very large size of the project, this research studies the innovation team members of two clusters of villas and the golf course. As shown in Figure 5-2 in the previous section, it consisted of the owner S, the EVP BM, the SVP technical, the

COO, the CFO, On-site project director, the design team, contractors, consultants and partners all along with their own teams.

As was mentioned earlier, the owner of the project did not have direct contact with the team members except for BM and the SVP technical. He usually approved or rejected the plans delivered to him by BM. Therefore, in practice, the team leader was BM. BM showed an interest towards sustainability and innovations, however, he seemed very controlled by the fact that the projects' main objective was profit making and not delivering innovative sustainable solutions. He was a very good manager in terms of the skills required on the project, but he wasn't the visionary type and this was clearly evident to the team members.

The team was very skilled and professional with years of experience in the field; however, they did not seem to have a strong sense of commitment and belonging to the project. The design team were the major group that showed passion and affective attachment and the on-site project director as well seemed to have grown attached to the project. He mentioned that this project was becoming part of his life since he spends most of his day working to make it successful.

The team members showed an understanding of their interdependence and the fact that every one's job was important and complements the others. They worked well together in a professional way and were exhibiting a high degree of job satisfaction especially in phase 1 and 2. The main project manager from the contracting company was not as satisfied though as were the other team members. He felt segregated from the team and usually blamed them for the delays and problems that happened in phase

3 of the project. Miscommunication, misinterpretation, and late communication of changes in the scope were major shortfalls from his point of view. He also mentioned that there was no direct communication with BM and this could be a reason for the persistence of some of the problems. The team in general did not communicate any strong connection with BM except the executive level employers, which further supports the sense of team hierarchy that the researcher had identified through the weekly observations she performed.

5.2.7 Innovation effectiveness

Consistent with meeting the goal within budget and time frame, the team members of the AKO project believed that improving the quality of life of the residents through their design that enhanced the use of nature and greenery and embedded a luxurious sport and club facilities was what would make their project most effective. They also agreed that achieving a self-sustaining community that has all the needs and the wants of residents within walking or bicycling distance was another factor that indicated the effectiveness of the project. Some team members mentioned that creating a sense of community was very important, it could be achieved through the different facilities that the project provided such as the golf club, the spa, the shopping mall, nurseries and schools, cafes and restaurants where the residents of the community could meet and enjoy their time together. Finally, the team mentioned that the financial return of the project was a very important indicator of the effectiveness of the project. The EVP declined to provide sales figures for the development, but he mentioned that the work done to-date was an indication of demand and payment instalments by the people who have already purchased properties.

5.2.8 Case 2 summary

The AKO project is a large-scale mixed use residential development that embeds a golf course and natural environment to the residential developments in an attempt to create a self-sustaining community. The project aims to provide a luxury-housing environment while following sustainability standards. This research study's main interest is to examine the relationship between the leader BM, the integration of internal and external stakeholders, and the innovation team to determine their influence on each other and the identity of the innovation team, and finally, to conclude if there is a contribution to the effectiveness of the innovation.

The AKO project status is active and progressing positively, the leader of the project is very professional and skillful but lacks the visionary and championing skills that are necessary for an innovative project. The relationship between the team members themselves and between them and their leader is very professional and there is a sense of hierarchy between them. There are different kinds of challenges when dealing with stakeholders, whereas some are resolved by negotiations and communications, others, especially those during the execution phase, cause delays and conflicts. Some important stakeholders such as universities and customers were not integrated within the project. Others such as contractors were integrated only at a late stage, which caused some conflicts and misunderstandings.

At the time of the data collection, the project was effective in terms of being on budget and schedule and in achieving some of the environmental aspects of its project plans. The social effectiveness of the project will be studied and evaluated after the completion of the project.

5.3 Case 3: JFZ

5.3.1 Introduction

Unlike SC and AKO, JFZ is a staff accommodation project, which comprises of three junior block buildings that cover an area of 64,773 square metres. The project also includes three self-messing halls, a gymnasium, a clinic, tennis and basketball courts, a playground and landscaping works. The project claims that it is sustainable in terms of the architectural choices of the buildings that provide natural shading and wind circulation and it terms of the products and materials used in construction.

The project is owned by a famous semi-private trading organization in Dubai (DW) that thrives to achieve excellence in performance. Environment is an essential concern for DW. They continuously display commitment to preserving the environment by endorsing environmentally friendly practices throughout their operations. Their environmental policy covers various aspects of the environment ranging from energy efficiency, renewable energy, green building standards and planting.

The chairman of DW is one of the most prominent businessmen in Dubai, with a string of government-linked ventures. Responding to Dubai's vision to be one of the top ten sustainable cities by 2020, he promulgated and diffused sustainability across his organization. JFZ is one of the projects that are owned and developed by DW. JFZ is led by AD, a senior project manager in the engineering department. AD is a very enthusiastic manager that is open to new ideas and solutions. He is responsible for developing and managing all aspects of the project. The executive level used a hands-off, delegated approach where they established milestones and only managed the milestones.

5.3.2 The sustainable innovation aspect of the JFZ project

As mentioned earlier, the chairman's commitment to play a role in achieving the Dubai sustainable vision encouraged the team and the team leader to look for new sustainable products and solutions to adopt in their project. The project started off in a traditional way; AD was informed that a staff accommodation project that responds to sustainability is required from him. He started developing the concept with an in-house architect and a civil engineer. At the next stage, they hired a consultant to develop the technical plan and the design of the project. They undertook research to learn about the different ways for achieving a better sustainable outcome in their project. They learnt about different construction products before the tendering stage. After that, different contractors bid for the project. AD was interested in a contractor (JIH) that presented a new sustainable product that they hadn't used before in their projects. AD became interested in this specific product when they were performing their research on sustainable products and processes. Therefore, they appointed JIH to build JFZ using the new product that is considered an innovation within the boundaries of their organization.

The product itself was not new in the market, however JFZ was the first project developed in DW to use it. The product was a 3D wire panel that was used instead of bricks for building walls. The 3D panels consisted of reinforcing welded wire meshes, an expanded polystyrene core and diagonal truss wires connecting them to assure fast and high quality construction. It was suitable in terms of sustainability because the expanded polystyrene had good thermal and sound insulation properties while being strong and reliable at the same time. In addition to that, it reduced construction cost and time and did not require heavy construction equipment. It also enabled a 30% reduction in required manpower.

5.3.3 The JFZ project leadership

AD, the project manager, was an experienced civil engineer with a strong project management background. He was very enthusiastic about his job and was keen on improving the routine practices that were used in sizable organizations like DW to make them more innovative and supportive of sustainability. AD reported to the VP of the engineering department who was committed to achieving excellence in his department and was supportive of new innovative ideas so long as they were considered to be financially feasible. With almost twenty years of experience in the local market, AD knew how to handle the different stakeholders very well. He was very familiar with the authorities and their requirements and he communicated with them in a language that they could understand. He said that knowing the different stakeholders and their urgency is very important to get the job done without delays.

He was open to new ideas and innovations; however, he was not the kind of leader that would motivate his team to innovate. It was obvious that AD was very organized and rigorous in meeting deadlines, which to an extent discouraged new ideas to develop since there wasn't sufficient time and space for developing new ideas within the project schedule. AD was political in the way he handled the different levels of stakeholders. It was noticeable that he changed his attitude depending on whom he was dealing with. He was assertive, professional, submissive and calm when dealing with high power and important stakeholders, while he was rigorous, loud, and superior when dealing with junior team members, contractor and sub- contractors.

Hence, he was able to gain higher-level consensus and approvals easily through his professional and persuasive attitude, and met milestones on time by putting his team under massive pressure.

5.3.4 The JFZ project and open innovation

To respond to the chairman's vision to make the organization one of the top sustainable organizations in Dubai, the Engineering Department paid specific attention to making their construction projects more sustainable. JFZ was one of the first projects in the department to move beyond the traditional way of working; which was based on their best practices and previous experiences in construction. It was noticeable that the department tended to be risk averse and preferred to appoint contractors and consultants that they knew and had previous experience of working with. This hindered the department's capacity to innovate and produce better quality projects. Consequently, when the need for sustainability arose in the department, they had to start thinking in a different manner because they did not have significant experience in this area of construction. The project leader and two of his team members started looking for ideas outside the boundaries of the organization.

Through engaging in research on sustainable products and processes, the project manager and his team identified several sustainable products that would be financially viable. Accordingly, they searched for contractors that were familiar with these products. Although they faced some resistance from the executive level management because of the risk associated with hiring a new contractor and using a new product, they were eventually successful in receiving approval for hiring a JIH familiar with the 3D paneling technique and its supplier. This happened only after presenting the new product to the executive management and convincing them of its sustainable and financial benefits.

5.3.5 The JFZ project and stakeholders

After the finalization of phase1 which basically involved identifying the need and developing the concept and its feasibility, the project team members were clearly identified consisting of the project leader (senior project manager), financier, legal consultant, design consultant, two engineers (civil and service), a designer and an architect. The long process of phase 1 and 2 required a considerable amount of communication with the relevant authorities. The benefit that JFZ had was the good relationship between the organization, the project leader specifically, and the governmental authorities. It facilitated getting the approvals faster. The challenge was to convince the executive management to take the risk and bemore open to the opportunities created by using new contractors andproducts. After a couple of meetings and a good presentation of the new concept, the executive management approved it.

In these phases the team dealt with a number of stakeholders such as:

- Authorities:
    - Dubai Land
    - DEWA
    - RTA
    - Civil Defence
    - Dubai Municipality
    - Emirates Environmental Agency

- Consultants
- Contractors

In JFZ, the contactor was involved in phase2 to ensure the possibility of using the product. The project was moving towards the end of phase 3 when the interviews and field visits were performed. The major stakeholders that have influenced the project are illustrated in Table 5-3. The table also shows the integration of stakeholders at the different phases of the project.

Table 5-3: The major stakeholders in each phase of the JFZ project

Phase 1 (Concept)	Phase 2 (Plan)	Phase 3 (Execute)
Innovation team - SPM (Innovation leader) - Designer - Architect - Engineers - SVP Engineering Chairman (Owner) Executive management	Innovation team - SPM (Innovation leader) - Design team - Financier - Contractor - Legal consultant SVP Engineering Chairman (Owner) Executive management Authorities Corporate enterprise Financial institutions	Innovation team - SPM (Innovation leader) - Design team - Financier - Contractor - Supplier - Legal consultant SVP Engineering Chairman (Owner) Executive management Authorities Subcontractors

Figure 5-3 further illustrates the major stakeholders that had an influence on the project while demonstrating the internal and external stakeholders that were part of the innovation team. The project leader, design team, financier and legal consultant were internal stakeholders and part of the innovation team. The SVP of engineering was part of the team at the concept phase only, then he handed the work to AD, the team leader and only supervised the project at a higher level. The design consultant, contractor, subcontractor and supplier were external stakeholders and part of the innovation team in the case of the JFZ project.

Figure 5-3: Internal and external stakeholders in the JFZ project

5.3.6 The JFZ project team

The members that had a direct influence on the development of the sustainable innovation of the project were the ones that were considered the innovation team members. As shown in Figure 5-3 in the previous section, it consisted of the innovation leader AD, the design team, the financiers, the legal consultant, the contractor, the supplier and the design consultant. As mentioned earlier, the owner of the project and the executive management did not have direct contact with the team members. They were only responsible for tracking milestones. Therefore, the team leader was AD. AD showed an interest towards sustainability and innovations, however, he seemed very rigorous about meeting deadlines and getting the work done which hindered the opportunity and potential to innovate in-house.

The team was skilled and professional with years of experience in the field; however, they did not seem to have a strong sense of belonging to the project. They were only performing the tasks that were given to them and they seemed lacking in motivation and attachment to the project. The team exhibited interdependence with one another, knowing each members' capabilities and duties; they complemented each other's work and performed professionally well together. They dealt competently with other teams and stakeholders as well, sharing and exchanging their knowledge and expertise. However, it was noticeable that some team members tried to avoid communicating with the leader. Some of them alerted the researcher about his attitude and loudness before meeting him. They felt uncomfortable talking to him. The contractor was very tense when talking about the leader; it was obvious that they had had conflicts. Through observation, the researcher noticed that the leader showed superiority when dealing with the contractor, possibly perhaps for some ethnic reasons.

5.3.7 Innovation effectiveness

According to AD, the main goal was to deliver the project within budget and time frame, especially given that one of the main reasons for choosing the new product was the time and cost it could save. Therefore, to him, the product could be considered effective if it met those two criteria. Another measure of its effectiveness, AD added, was to meet its environmental sustainability goal by insulating heat and reducing the need to use air conditioning, and consequently, reducing electricity usage. The product was under installation at the time of the data collection. It was effective at that time in terms of reducing the need for heavy machinery and manpower. It saved time and money as had been anticipated.

5.3.8 Case 3 summary

The JFZ project is a staff accommodation project owned by a semi-private trading organization in Dubai that aimed to be one of the top 10 most sustainable organizations in the city. The project used a sustainable building product that could save manpower, cost, time and reduce the usage of electricity by insulating heat. The product was not new to the market but it was new within the boundaries of the organization.

The project leader, a senior project manager, was appointed by the SVP of the engineering department who was involved at the concept stage and then handed all of the project over to the project leader. The project leader was a strict and experienced manager who was well known for delivering projects within budget and time frame. The leader was very tough on the team members, which was reflected in the way the team members view him. The team was very experienced and professional, they did their tasks on time and as required. Nonetheless, there was an obvious lack of satisfaction, attachment and sense of emotional belonging to each other and the project.

The product was effective at the time of data collection in terms of reducing the need for heavy machinery and manpower, and it saved time and money as projected. At the time of the data collection, the project was effective in terms of being on budget and schedule and in achieving some of the environmental aspects of its project plans. The social effectiveness of the project will be studied and evaluated after the completion of the project.

Chapter 6- Case study results and interpretation

Introduction to Chapter

This chapter describes the interpretation of data obtained from the interviews transcripts, observation notes, and documentation from three different cases. Data are analyzed to identify, describe and explore the relationships between the major constructs of the thesis namely open innovation, leadership for innovation (LI), stakeholder integration (SI), team identity (TI), and innovation effectiveness (IE). The synthesis of the three data sets, their meaning, and the findings are described and explained for each case followed by a cross case analysis to compare the findings obtained from the three cases.

6.1 Overview of the data:

The concurrent data collection and analysis involved in this case study research included approximately 35 hours of nonparticipant observation of three case studies, 30 hours of semi-structured interviews, and an extensive exercise to examine relevant documents. These different methods of data collection were conducted to enhance the depth and breadth of knowledge about innovation in construction. Furthermore, they contributed towards achieving the objectives of this research, which are listed below:

1. Examine the influence of innovation leaders on stakeholder integration and team identity in an open innovation context in construction projects
2. Examine the relationship between stakeholder integration and team identity in an open innovation context in construction projects

3. Investigate the relationship between the innovation leader, stakeholder integration, and team identity on the effectiveness of the innovation in an open innovation context in construction projects
4. Investigate the effect of an open innovation context on innovation effectiveness in construction projects.
5. Develop an empirically tested model that encapsulates the above-identified constructs and the uncovered relationships, which can then be used to depict the mechanisms of enhancing innovation effectiveness in construction projects.

During the 35 hours of nonparticipant observation in the three different cases, handwritten and taped memos were made by the researcher and entered into NVivo software to assist with their analysis and interpretation.

In addition, thirty-eight different stakeholders and project team members were selected from the three cases to investigate the different aspects of open innovation, innovation leaders, stakeholder integration, team identity, and the innovation effectiveness. The participants were different stakeholders in the project consisting of 7 leaders, 12 design team members, 7 consultants, 7 contractors, 2 suppliers and 3 other people from administrative positions (See Figure 6-1). The selection of participants was guided by the objective of the study. Through purposive sampling, participants were selected according to the criteria of the research questions; hence, stakeholders, innovation team members and leaders were selected as a sample. It is worth to note that the innovation leaders have different positions and titles in the three case studies which are pointed out clearly in the participants profile table in each case, however, the terms leaders, innovation leaders, team leaders are used interchangeably to make it easier to relate to the model construct we are studying. In addition to that, the stakeholders that were selected were the ones who the participants or the researcher considered had significant influence on innovation during the project; this was achieved through snowball sampling, which was undertaken throughout the period of data collection.

Each interview lasted from 30 minutes to 1 hour except for the interviews with the project leaders, which lasted for 2 hours. The interviews were tape-recorded and transcribed afterwards, then entered into NVivo software to assist with analysis.

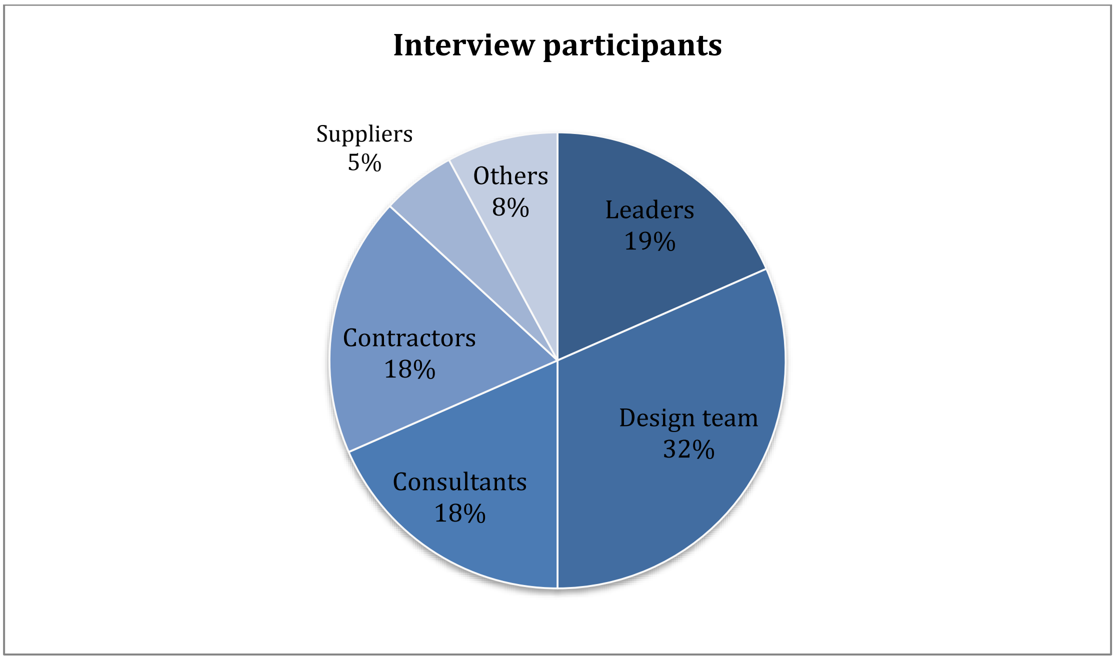


Figure 6-1: The interview participants

The reason for a high number of design team participants is their importance and influence on the innovation whereas the low number of suppliers is due to their comparatively low identified influence on the innovation in the studied cases. It is important to note that suppliers and subcontractors generally play an important role in project innovation, however, this was not the case in these case studies as explained earlier.

Overview of the selected data analysis methods

Data was analyzed through a directed content analysis method where the researcher uses existing theory or prior research to develop the initial coding scheme before beginning to analyze the data (Mayring 2002; Kyngas & Vanhanen 1999). Then, as the analysis proceeds, additional codes are developed, and the initial coding scheme is revised and refined. Researchers employing a directed approach can efficiently extend or refine existing theory (Mayring 2002; Hsieh & Shannon 2005).

6.2 The Directed content analysis approach

To be able to achieve the directed content analysis, a deductive category assignment and an inductive category formation for the rising themes were performed (Mayring 2002; Mayring 2014).

6.2.1 The deductive category assignment method

This is the most central content-analytical method. Its goal is to extract a specific structure from the material in the form of a category system. All textual components addressed by the categories are then systematically extracted from the material. In this case, the major structuring dimensions must be exactly determined and theoretically based. These dimensions are then subdivided and resolved into individual features or values. Afterwards, the dimensions and values are brought together to form a category system (Mayring 2002; Mayring 2014). The key steps of the deductive category assignment method is illustrated in the following diagram:

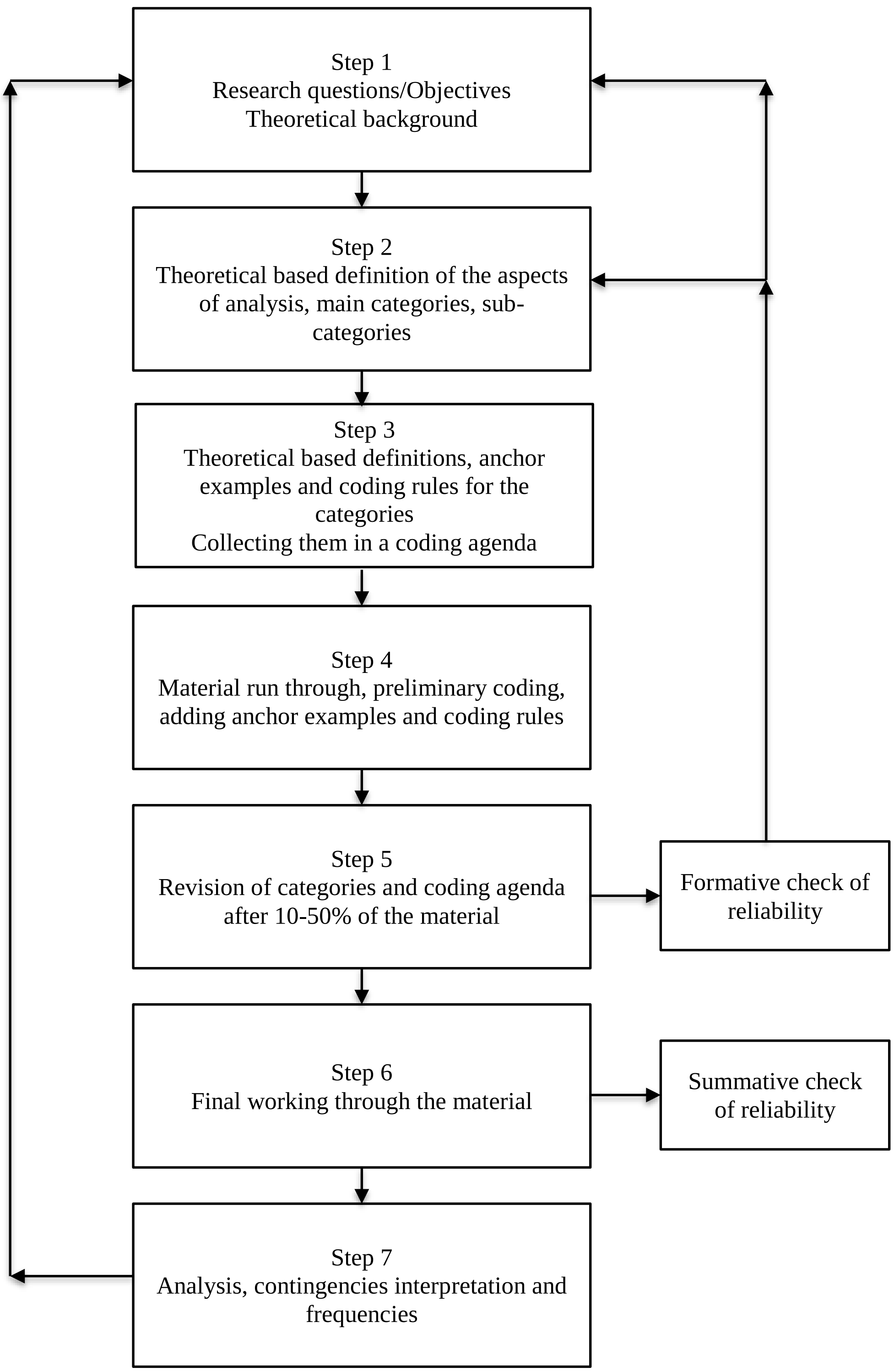


Figure 6-2: Key steps of the deductive category assignment method (Mayring 2014, p.96)

First step: Research questions

Following Mayring's (2014) approach, the first step to arrive at sound interpretations of the data in the different cases is to identify the key questions that the data should answer based on a solid theoretical background. The questions that this method of data analysis was intended to address are shaded in the following table:

Table 6-1: Thesis research questions

RQ1	What is the effect of leadership for innovation on stakeholder integration in an open innovation context?
RQ2	What is the effect of leadership for innovation on the innovation team identity in an open innovation context?
RQ3	What is the relationship between stakeholder integration and innovation team identity?
RQ4	What is the relationship between the innovation leader, stakeholder integration, and team identity in an open innovation context?
RQ5	How can leadership for innovation, stakeholder integration and team identity lead to effective open innovation throughout the construction project lifecycle?

Second step: Definition of categories

Based on a thorough review of the literature the following conceptual model was developed.

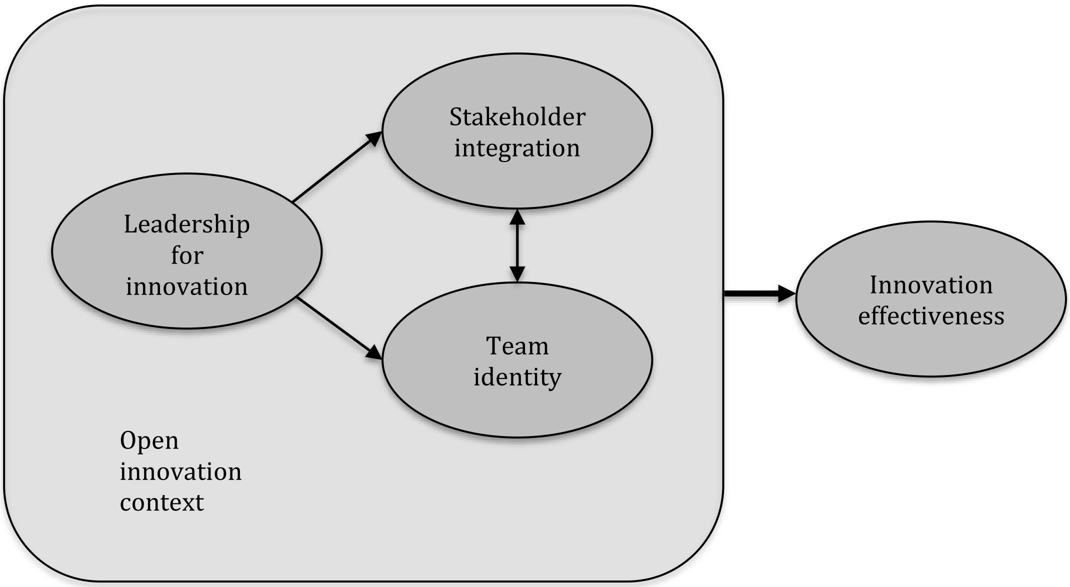


Figure 6-3: The conceptual model of the thesis

Each of the main categories was defined and its main dimensions identified and defined, and subsequently their main variables were identified based on theory (See section 3.1). The observation, description of cases and interview questions were developed according to these main constructs and dimensions (Table 6-2).

Table 6-2: The conceptual thematic framework for the interview data

Conceptual thematic framework
1. Leadership for innovation
1.1 Encouraging and stimulating innovation 1.2 Providing and inspiring vision 1.3 Individualized support 1.4 Teamwork development 1.5 Stakeholder integration
2. Stakeholder integration
2.1 Knowledge of stakeholders 2.2 Stakeholders interactions 2.3 Behaviours adaptation
3. Team identity
Team level: 3.1 Boundary clarity 3.2 Boundary permeability 3.3 Cohesion 3.4 Common language and understanding 3.5 Cooperative working atmosphere 3.6 Cognitive similarity *Individual level:* 3.7 Self-categorization 3.8 Evaluation 3.9 Importance 3.10 Attachment and sense of interdependence 3.11 Social embeddedness 3.12 Behavioural involvement 3.13 Content and meaning
4. Innovation effectiveness
4.1 Effective/efficient innovation capacity 4.2 Future/expected innovation potential

Third step: Developing a coding agenda

A coding agenda was then developed which is the basis for structuring the content analysis. The exact description of the constructs through definitions, anchor samples and encoding rules, which have been explained previously in the methodology section, are presented in a table as a form of an encoding guide for the different constructs of the research.

Fourth step: Coding

The text passages that are relevant to the main constructs were marked and added to their relevant nodes using NVivo. Several iterations of analysis of the data was performed. The codes have to be kept consistent with the general definition of the themes. For example, every point at which leadership for innovation was mentioned in the material was selected and categorised under the leadership for innovation node. Within such passages the specific portions of text that discussed the different categories of leadership were selected and assigned to their relevant child nodes. A child node named "perception about leadership" was created that contained positive, negative and neutral leadership for innovation grandchild nodes to analyze and interpret the text accordingly.

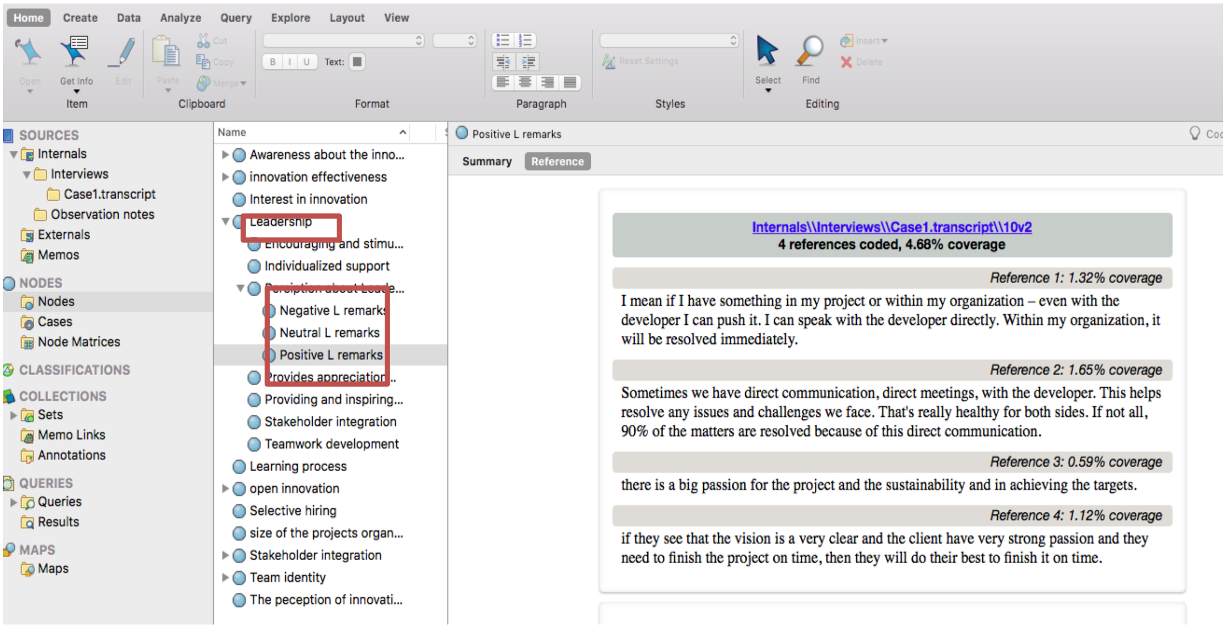


Figure 6-4: Coding using NVivo

Fifth step: Revision

When the coding agenda was completed, and the coding process became smooth after approximately 50% of the material was comprehensively analysed; all of the category definitions and coding rules were checked again for their significance and relevance to the research questions (face validity) (Mayring 2014).

Sixth step: Final work through

If any changes in the coding agenda made the prior assignments seem inconsistent or meaningless, the data and categories were reworked from the beginning.

Seventh step: Analysis

The frequencies of the codes over all recording units and comparisons of frequencies in different groups of recording units were analyzed statistically.

A correlation analysis was performed in cases where several ordinal category systems were assigned to the same recording units. This method facilitated understanding the relationships between the three major constructs in the conceptual model namely leadership for innovation, stakeholder integration, and team identity. It also facilitated classification of the various attitudes and opinions of the different stakeholders, which was performed to understand how they influenced each type of stakeholder and consequently ascertain whether this influence had an effect on innovation effectiveness. The next method performed was implemented to further understand the major aspects that influenced the different leaders, stakeholders and team members to address the gap in the literature and develop the conceptual model of this thesis.

6.2.2 The inductive category formation

The inductive category formation method proposed by Mayring (2002) and Mayring (2014) is a qualitative content analysis method that enables a rapid and more specific procedure to reduce and code relevant materials to answer specific research questions. In this method of content analysis not all material is considered for analysis. The data that are relevant to a specific research question are considered therefore it is vital to follow a rule of selection. In this method, the step of building paraphrases is omitted and the level of reduction is defined in advance. The key steps of the inductive category formation method are illustrated in the following diagram:

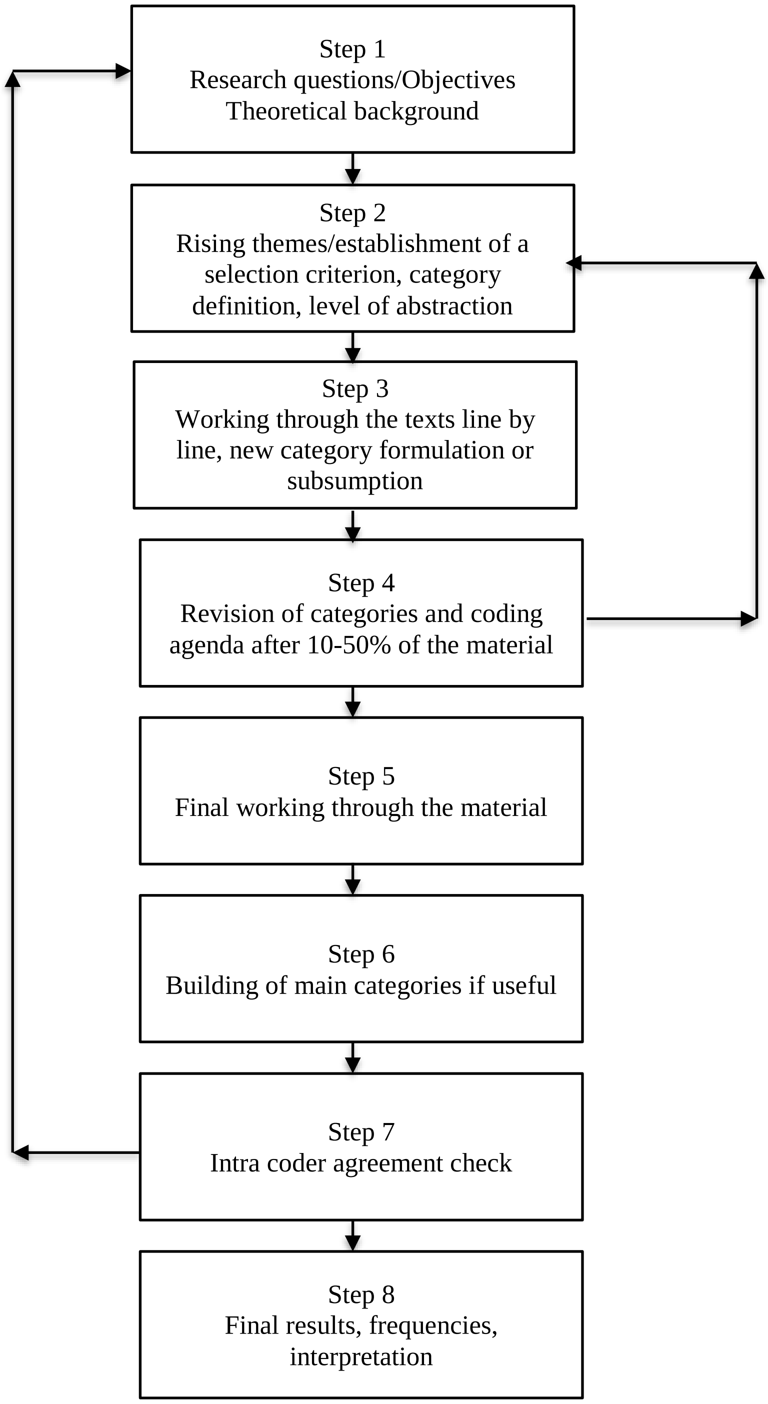


Figure 6-4: Key steps of the inductive category formation method (Mayring 2014, p. 80)

First step: Research questions

Following Mayring’s (2014) approach, the fifth research question is the subject of this section.

Table 6-3: Thesis research questions

RQ1	What is the effect of leadership for innovation on stakeholder integration in an open innovation context?
RQ2	What is the effect of leadership for innovation on the innovation team identity in an open innovation context?
RQ3	What is the effect of stakeholder integration on the innovation team identity?
RQ4	What is the relationship between the innovation leader, stakeholder integration, and team identity in an open innovation context?
RQ5	How can leadership for innovation, stakeholder integration and team identity lead to effective open innovation throughout the construction project lifecycle?

Second step: Rising themes/establishment of a selection criterion, category definition, level of abstraction

The rising (or emerging) themes that were found through the first content analysis method and were seen as fitting to answer other research questions were highlighted and explicitly defined to serve as a selection criterion to determine the relevant material from the texts. The level of abstraction guides how specific or general the categories have to be formulated.

Third step: Coding the text

The text passages that are relevant to the related and previously defined rising categories were marked and added to their relevant nodes using NVivo All other materials were ignored in this procedure. If some text did not fit in with the categories available but added to answering the research question, then a new category was formulated by creating new parent nodes in NVivo.

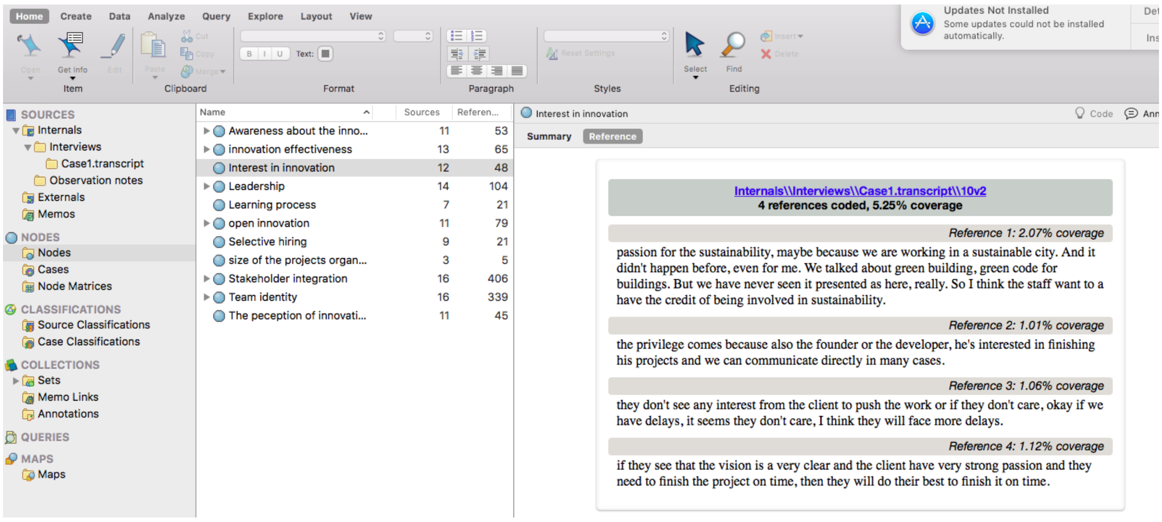


Figure 6-6: New categories using an inductive content analysis method.

Forth step: Revision

When a category system seemed stable, the researcher rechecked if it was relevant to the research question. In cases where it did not, then a revision of the category definition was made. Following that, a check of the degree of generalization was undertaken. If a change in a category definition and/or the level of abstraction was made, the analysis was repeated again from the beginning.

Fifth step: Final coding

The whole dataset was analysed and reviewed following the same rules.

Sixth step: Main categories

At the end of this process, a list of categories was developed. Some were grouped together to build the main categories, when they were perceived as relevant to answering the research question.

Seventh step: Intra coder check

The researcher coded again from the beginning of the data and compared the results.

Eighth step: Results

The results are the list of categories and the main categories that were found to be consistent in several text passages and answering the research questions.

A frequency analysis of the category occurrences was also made to interpret the categories and their frequencies in the light of the research question.

6.3 Case 1: Interpretation and results

6.3.1 Case1 (The SC project) overview

The SC project is an innovative project that is unique in the MENA region and is an interesting case relevant to many countries across the world. The project provides a luxury-housing environment while following sustainability standards. This research studied the relationship between the leader FS, the integration of internal and external stakeholders, and the innovation team to determine their influence on each other, on the identity of the innovation team and finally to conclude if there is an influence on the effectiveness of the innovation.

6.3.2 Participants profile

A summary of the participants of the group interview is illustrated in Table 6-4 below.

Table 6-4: Participants of the interviews in the SC case

Interviewee number	Type of stakeholder	Position
#1	Leader (Client)	Founder/CEO
#2	Others	Education project manager
#3	Design team	Design manager
#4	Design team	Sustainability Engineer
#5	Design team	Sustainability civil Engineer
#6	Others	CRM
#7	Others	Operations officer
#8	Leader (Client)	CO-founder/SVP
#9	Contractor	Lead architect
#10	Contractor	Project director
#11	Design team	Design manager
#12	Consultant	Solar Electrical Engineer
#13	Contractor	Mechanical manager
#14	Contractor	Owner
#15	Supplier	Manager
#16	Consultant	CEO

The participants of the interviews were selected according to their influence on the innovation. Each participant was associated with a specific stakeholder category to ensure that the main stakeholder categories that had a major influence on the innovation were included and interviewed.

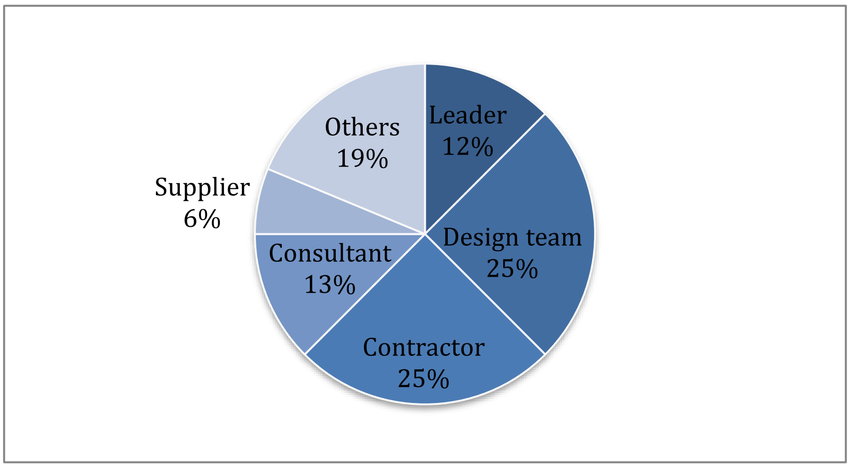


Figure 6-7: The interview participants -SC case

6.3.3 Case study context

This research on open innovation residential construction projects presented a number of questions to the selected interviewees to examine the open innovation context. The main dimensions of open innovation that were obtained from the literature were taken into consideration to develop the questions. The following table clarifies the dimensions and the related questions to ensure that the case context can be defined as open innovation.

Table 6-5: Interview questions related to open innovation

Dimensions open innovation	Questions to leaders and top managers	Questions to team
Inward IP licensing and External participation		
Outsourcing R&D and external networking		
Customer involvement		
Employee involvement		
Venturing		
Outward IP licensing		

The following chart represents the number of coding references for each open innovation dimension. It reveals that the SC case utilized different means of open innovation covering all of the dimensions. Nevertheless, some aspects were mentioned more frequently than others such as outsourcing R&D and external networking (27 codes) and customer involvement (23 codes). Other aspects such as employee involvement, venturing and Inward IP licensing and external participation had almost similar number of coding references whereas outward IP licensing had only 2 codes.

This analysis supports that the innovation was open and was frequently described as relying principally on aspects such as outsourcing R&D, external networking, and customer involvement.

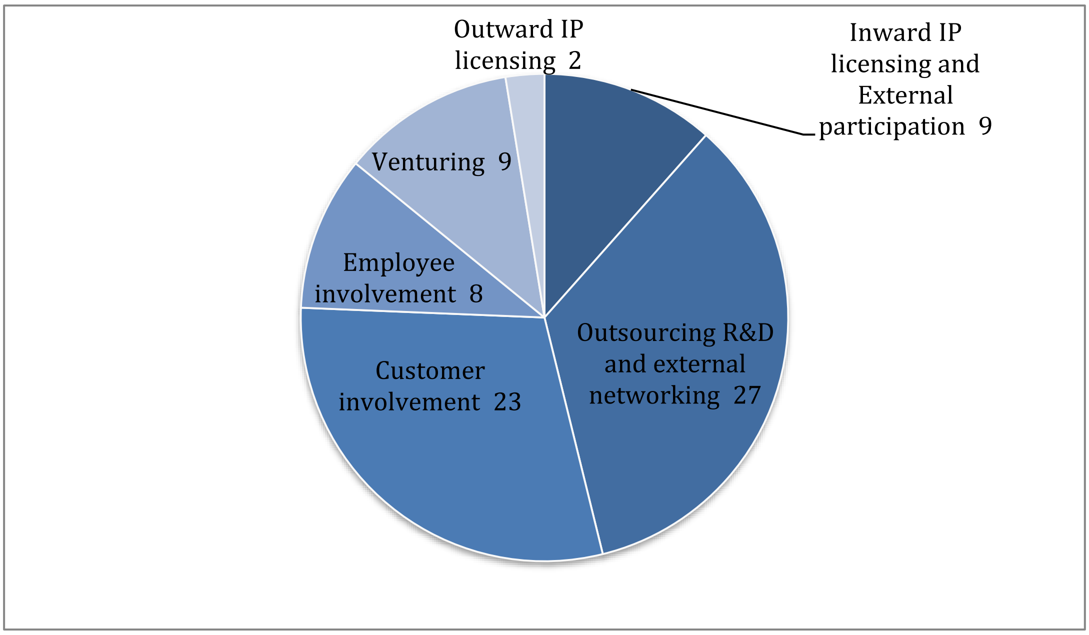


Figure 6-8: Number of coding references of open innovation dimensions -SC case

6.3.4 Interview interpretation and results

6.3.4.1 Category 1: Leadership for innovation (LI)

A number of questions were asked to understand the influence of leadership for innovation on stakeholder integration, team identity and the overall effectiveness of the innovation. Based on the literature on leadership for innovation, the main dimensions of leadership were taken into consideration to develop the interview questions. The following table illustrates the dimensions and the related questions that were asked of the leaders and the team in order to interpret and comprehend their influence on the other constructs of this research.

Table 6-6: Interview questions related to the LI dimensions

Dimensions of leadership for innovation	Questions to leaders and top managers	Questions to team
1.1 Encouraging and stimulating innovation	Who managed developing the plan? How did you motivate the team to innovate?	Were you encouraged and motivated to collaborate? Do you feel passionate about the project? In what way? What encourages you to perform your tasks?
1.2 Providing and inspiring vision	How did you develop this idea? How would you improve the project? What skills do you think were the most important to put up the idea and develop such a plan?	What accounts for the success of the project? What do you think of your leader?
1.3 Individualized support	How did you motivate the team to achieve the expected goals?	How supportive was the leader?
1.4 Teamwork development	How did you motivate the team to achieve the expected goals? Who ensured managing stakeholders, addressing their needs and demands? How do you manage the team?	Who ensured managing stakeholders, addressing their needs and demands? Tell me about you and the team, how did you work together to achieve the projects goal?
1.5 Stakeholder integration	How did you manage stakeholders? Do you think involving stakeholders at an early stage results in better outcomes?	How did you deal with the different stakeholders? Could you explain how the management has dealt with the different stakeholders?

The next step was to theoretically define leadership for innovation and the main dimensions to be able to code text accordingly. This step was done previously in Section 3.1. To revise and approve the dimensions of each category, the following chart illustrates the number of coding references in each dimension.

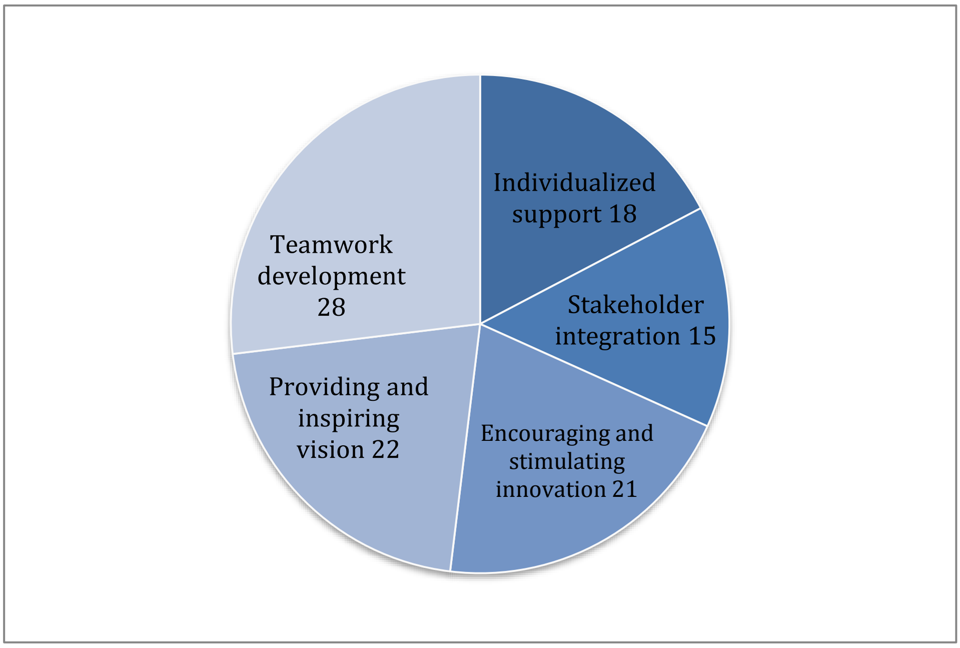


Figure 6-9: Number of coding references of LI dimensions-SC case

A sufficient number of coding references for each dimension was apparent. These frequencies are evidence indicating reliability of the dimensions and the research questions that are related to each one and so a decision to retain all of the dimensions was made by the researcher.

The discussion within the category of leadership for innovation produced 104 related passages, which involved contributions by 15 out of 16 interviewees. This category was subdivided into five dimensions, as illustrated in the category model in Figure 6-9. The dimensions profile in Table 6-7 elaborates further on the differences in the responses between the dimensions in terms of the types of stakeholders.

Table 6-7: Dimension profile- LI- SC case

	Consultants	Contractors	Leaders	Design team	Suppliers	Others	Total
1.1 Encouraging and stimulating innovation	3	7	6	3	0	2	**21**
1.2 Providing and inspiring vision	4	1	6	7	0	4	**22**
1.3 Individualized support	1	4	3	9	0	1	**18**
1.4 Teamwork development	5	7	6	7	0	3	**28**
1.5 Stakeholder integration	4	3	3	3	0	2	**15**
Total	**17**	**22**	**24**	**29**	**0**	**12**	**104**

1.1 Encouraging and stimulating innovation

It is apparent from the table above that the 'Encouraging and stimulating innovation' dimension was frequently mentioned by both the contractors and the leaders. This dimension was less frequently mentioned by the consultants and the design team, and was not mentioned at all by the supplier. Interviewees reflected on this dimension mainly through describing the leader as an encouraging person that urges others to develop their own ideas. The consultant, #16, said, "but generally we got a good response from their side. They were open-minded to listen to everybody" and #14 said, "the owner is very open-minded, he takes ideas from everyone." They described the leader as a person who looks constantly for opportunities to improve the project and boost innovation. For example, the contractor, #13, said, "if it is a good idea it doesn't usually gets rejected here." Moreover, several interviewees noticed that the leader displays a sense of power and confidence that supports innovation in the project. The design manager, #11, said, "he has a huge amount of courage to be doing a project like this." Several interviewees mentioned that the leader seeks out and promotes new ideas and technologies, a design team member, #2, said, "they want something unique” and #14 said, “[i]f there is a good outcome out of these ideas, the owner welcomes them and he even invest more money for them.”

1.2 Providing and inspiring vision

Both leaders and the design team emphasised that it is very important to provide and inspire vision resulting in them have the highest numbers of codes attributed to this dimension. The frequencies for consultants and the other administrative positions came next. Contractors did not mention this dimension very often and there was only one code that states: “there is a big passion for the project and the sustainability and in achieving the targets.” It was mentioned by #10 when describing leadership.

Most interviewees mentioned how important it was that their leader created and expressed an exciting vision of the future, for example the design manager #11 said, “our owner, FS, obviously has some very important skills as far as visioning what he wants” while a design team member said, “[t]he CEO and his partner have a very innovative way of thinking. They're always forward-thinking, and you can really see it reflected in the vision of this project.” Interestingly, the interviewees did not only mention that the vision of leader is important for the sake of the innovation but also the way he inspires others is as important as well. The sustainability engineer said, “the amount of knowledge that FS has, it's mind blowing. In a way he's a role model.”

1.3 Individualized support

The design team predominantly drew attention to individualized support. Many interviewees stated that their leader is approachable and easy to talk to about job-related problems, for example, #5 stated, “our CEO, imagine if we want anything, we go directly to him" and the contractor, #10, said, "I can speak with the developer directly. Within my organization, it will be resolved immediately."

The leaders realized the importance of spending time teaching and coaching the team members, #1 mentioned, "my partner and I were leading them to guide and tune what they do." They described and gave examples of how they recognized the potential and contribution of individuals , #11 said, "that was probably the second step that the management did, identify what people liked to do, and which people are good at doing certain things, and then divided up the work accordingly." The consultant and others, however, did not elaborate about this dimension; only 1 code was highlighted.

1.4 Teamwork development

Teamwork development was the predominant dimension mentioned by the different stakeholders (28 codes). Almost all stakeholders mentioned it as an important aspect in leadership for innovation. Some interviewees pointed out that the leader encourages the team and the different stakeholders to share information and resources to foster the climate of collaboration, for example, a contractor (#14), mentioned "we have a Whatssap group, anyone who travels, sends pictures of items, materials and ideas that might benefit our project, then when he is back we discuss and explain."

Leader #1 explained about the importance of fostering collaboration and teamwork, he mentioned "so if we need a research about energy for example, everyone works, the architect, the engineer, the designer, everyone. It was always a teamwork." Different members of the design team described how they worked as a family team. Interviewee #5 stated "we are working as a family team." and #3 said "he didn't have that hierarchy in the company. When you sit with him, you feel like you're sitting with your colleague or a family member.” Consultants and some other members made similar remarks about teamwork development.

1.5 Stakeholder integration

Almost all of the stakeholders mentioned stakeholder integration while discussing leadership for innovation. The accounts given by the consultants have the highest number of codes while other administrative team members had the lowest number. A general agreement amongst all interviewees was expressed on the role of the leader in promoting communication and engagement between the team and the different stakeholders. Contractor (#10) said, “[s]ometimes we have direct communication, direct meetings, with the developer. This helps resolve any issues and challenges we face. That's really healthy for both sides. If not all, 90% of the matters are resolved because of this direct communication.” Another aspect that was raised by the interviewees was considering stakeholders’ needs and demands, the leader (#1) said, [b]ased on previous experiences and conversations with potential end users we considered their needs and tried to develop our plan accordingly.” The awareness of the different types of stakeholders and their influence was also stated as an important aspect that their leader considers.

At the end of this coding process, the following coding agenda was developed to guide coding in order to categorize text into positive, negative and neutral views of leadership for innovation:

Table 6-8: Coding agenda for LI

Category	Value	Definition	Anchor examples	Encoding rules
Leadership for innovation	(+) Positive leadership for innovation	A positive goal-directed influence that the leader has over other members of the project in guiding, structuring, facilitating relationships and activities to achieve innovation i.e. -Encouraging and stimulating innovation -Providing and inspiring vision -Individualized support -Teamwork development -Stakeholder integration	"Our owner obviously has some very important skills as far as visioning what he wants" "So to develop something that no one else is doing is, is a big risk and its really rare to find someone that wants to carry a risk at that level."	All five aspects of the definition must be "positive" at least no aspect should allow the judgment of a neutral leadership for innovation; otherwise encoding for "neutral innovation leadership traits"
Leadership for innovation	(-) Negative leadership for innovation	Negative or poor influence on the other members of the innovation project to achieve the innovation goals i.e. -Not encouraging or stimulating innovation -Not providing or inspiring vision -Poor support to individuals -Poor teamwork development -Poor stakeholder integration	"Sometimes they don't listen to us, or it needs a lot of time and effort to reach them to discuss something, so I think many ideas are killed instantly even before trying to express them." "But sometimes when it comes to approvals and assigning consultants and contractors, they don't really take our opinions. Sometime we feel that they force them on us."	All five aspects point to negative leadership for innovation; otherwise encoding for "neutral leadership for innovation"
Leadership for innovation	(0) Neutral leadership for innovation	There is no clear influence on the innovation from the leader.	"We would have more courage to discuss ideas with him, we would try to express our thoughts freely. The leader influences that a lot. Because he is the connection between the executive level and us."	Not all five aspects point to positive or negative leadership for innovation

The table below is the result of coding to categorize text into positive, negative and neutral interviewees' remarks about leadership for innovation in Case 1.

Table 6-9: Stakeholders' remarks about LI- SC case

Type of stakeholder	Negative leadership for innovation remarks	Positive leadership for innovation remarks	Neutral leadership for innovation remarks
Consultants	0	8	0
Contractors	0	11	2
Leaders	0	14	0
Design team	0	18	1
Suppliers	0	0	0
Others	0	10	0
Total	0	61	4

The table shows that most stakeholders made positive remarks about leadership for innovation in the SC case. The design team expressed the most positive and highest number of remarks (18 codes) followed by the leaders, the contractor, the other administrative positions, and then, the consultants. The supplier did not make any obvious remarks on leadership for innovation, though. Two remarks from the contractors were neutral and one from the design team. There were no negative remarks made about leadership by any interviewee in this case. The following table represents examples of significant positive and neutral statements by the different types of stakeholders. The related dimension's number follows each statement.

Table 6-10: Significant statements about LI- SC case

Positive significant statements about leadership for innovation	
Consultants	It was the client (leader) him self's idea to create some new sustainable development in Dubai (1.2) It was direct with the chairman Mr. F (1.4) They were open-minded to listen to everybody (The leaders) (1.1)
Contractors	Sometimes we have direct communication, direct meetings, with the developer (leader). This helps resolve any issues and challenges we face (1.4) There is a big passion for the project and sustainability and achieving the targets (1.1, 1.2) If they see that the vision is very clear and the client (leader) have very strong passion and they need to finish the project on time, then they will do their best to finish it on time (1.1) If it is a good idea it doesn't usually get rejected here (1.1) We communicate with the developer when he comes to the site. We talk and he is very open-minded and listens to us (1.5)
Leaders	This made me think what is my role in this? How can I achieve sustainability through what I know and do? This time I wanted to build something different, something unique and I said to myself, why don't we build a sustainable city (1.2) I wanted to know more about the other two pillars the social and the financial or commercial. I wanted to know how could a residential project achieve these three pillars of sustainability (1.2) Our goal was to achieve 50% less energy consuming though active design and design innovation (1.2) We also wanted to prove that all of this is commercially viable, so the integration of all of these aspects is what makes the Sustainable City an innovative project (1.2) Based on previous experiences and conversations with potential end users we considered their needs and tried to develop our plan accordingly (1.5) We were doing discussions. My partner and I were leading them to guide and tune what they do (1.3) We give them a responsibility to develop the ideas themselves (1.1) We give them a good role for them and we feel that they are passionate about it (1.3)
Design team	Our owner, Mr. F, obviously has some very important skills as far as visioning what he wants (1.2) How to get there from a commercial standpoint? Putting together the right team members (1.4) That was probably the second step that we did, identify what our people liked to do, which things, and which people are good at doing certain things, and then we divided up the work accordingly (1.3) So I find their management, very, very visionary, so Mr F is an exceptional, visionary person. He has a huge amount of courage to be doing a project like this (1.2) So to develop something that no one else is doing is, is a big risk and it's really rare to find someone that wants to carry a risk at that level (1.2) So when we have stakeholders, we're looking for collaboration and we're looking for I call them partnerships more than just interests (1.5) He's inspiring actually (1.2) The CEO and his partner have a very innovative way of thinking. They're always forward-thinking (1.2) He didn't have that hierarchy in the company. When you sit with him, you feel like you're sitting with your colleague (1.4) He really appreciated efforts (1.3) I can strongly say that he's my role model (1.2) We are working as a family team (1.4)
Suppliers	N/A
Neutral significant statements about leadership for innovation	
Contractors	We have weekly meetings with all of the major stakeholders every Staturday. The developer, the contractor, the consultants everyone sits on the table and discuss and deliver ideas (1.4)
Design team	They're trying to sell you something so that's very personal interest-based for them trying to get money from you and get their project, get their pro-product into the city, so they can use it for advertising. They have to encourage the lower staff, you know, through their work. They have to work as a team (1.5)

As clarified in the table above, the positive remarks covered all leadership for innovation dimensions, which are:

- Providing and inspiring vision.
- Encouraging and stimulating innovation.
- Provides an individualized support.
- Teamwork development.
- Stakeholder integration.

6.3.4.2 Category 2: Stakeholder integration (SI)

A number of questions were posed to understand stakeholder integration, its influence on team identity and the overall effectiveness of the innovation. Based on the literature on stakeholder integration, the main dimensions of stakeholder integration were taken into consideration to develop the interview questions. The following table illustrates the dimensions and the related questions that were presented to the leaders and to the team to be able to interpret and comprehend their influence on the other constructs of this research.

Table 6-11: Interview questions related to the SI dimensions

Dimensions of Stakeholder integration	Leaders	Team
2.1 Knowledge of stakeholders	Did you use any specific mechanism to identify stakeholders and manage them? What was it?	Did you have any previous experience with the different stakeholders that you dealt with?
2.2 Stakeholders interactions	What challenges did you face while dealing with stakeholders? How did you facilitate communication and collaboration among them?	What kind of challenges did you face while dealing with stakeholders? How supportive of the innovation stakeholders were?
2.3 Behaviours adaptation	How do you manage stakeholders' needs and demands?	How do you manage stakeholders' needs and demands?

The next step was to theoretically define stakeholder integration and the main dimensions to be able to code the text accordingly. This step was completed previously and was explained in Section 3.1. To revise and corroborate the dimensions of this category, the following chart illustrates the number of coding references for each dimension.

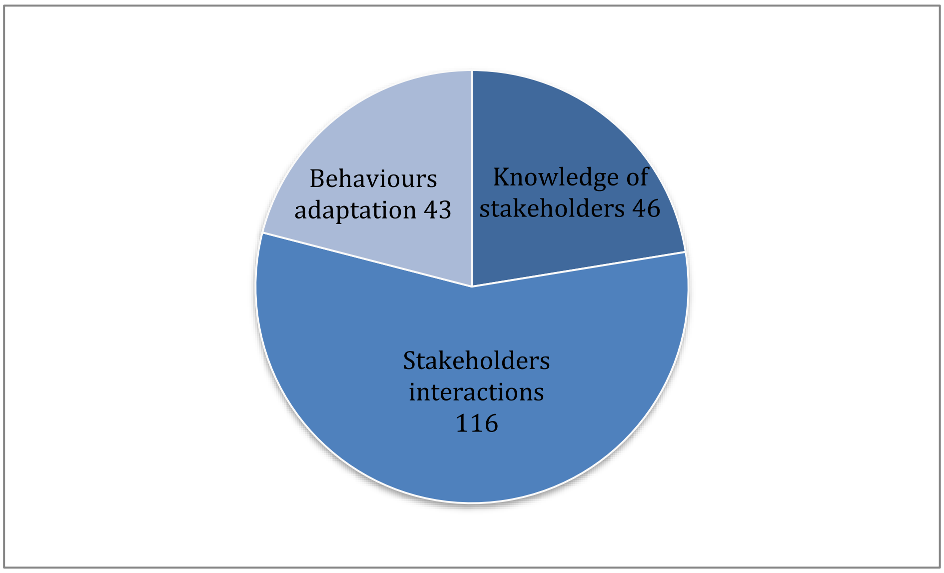


Figure 6-10: Number of coding references of SI dimensions-SC case

There were an adequate number of coding references for each dimension, which in relation to frequency of occurrence indicated trustworthiness of the dimensions and the research questions that are related to each one and a decision to keep all of the dimensions was made by the researcher. The dimension stakeholders' interactions had double the number of coding references in comparison to the other two dimensions though, however, due to the nature of this dimension, it was expected that the interviewees would talk about it more than they would about the other two.

The dialogue with the different interviewees about the category stakeholder integration produced 205 related passages, with the involvement of 16 out of 16 interviewees. The dimensions profile in Table 6-12 gives the frequency of responses amongst the dimensions in terms of the different types of stakeholders.

Table 6-12: Dimension profile- SI- SC case

	Consultants	Contractors	Leaders	Design team	Suppliers	Others	Total
2.1 Knowledge of stakeholders	9	13	5	14	2	3	**46**
2.2 Stakeholders interactions	16	34	22	33	3	8	**116**
2.3 Behaviours adaptation	5	11	8	15	1	3	**43**
Total	**30**	**58**	**35**	**62**	**6**	**14**	**205**

2.1 Knowledge of stakeholders

It is evident from the table above that both the contractors and the design team frequently mentioned aspects related to the 'knowledge of stakeholders' dimension. Some of their remarks were about the importance of having stakeholders that they have previous experience of working with, "because of the experience that we have with the previous sub-contractors" and "the knowledge how to deal with them, or how they will deal with us is very crucial" was mentioned by #9, the lead architect from the contracting company. A design manager from the design team (#11) similarly pointed out some of the important aspects related to this dimension. He described how devoting time and budget to know stakeholders' characteristics and benefits at different stages of the construction process is crucial, "the team that was put together for the master planning was ex-colleagues of mine, so we have worked together before and I knew they had similar passion," then he added:

> …but then moving forward as you started to engage in stakeholders for the actual construction of things, it gets a little different, you're looking for stakeholders that can support you in a timely fashion with the product that you're looking for.

The consultants and leaders were also aware of the importance of the issue and gave several accounts about it. The co-founder, #9, advocated that stakeholders should know each other and become aware of each others' demands and interests, he said "[w]e make them aware by meeting with them and explaining what we are going to do in our development, and explain to them their part of interest in the project." Although the supplier did not offer any comments about leadership for innovation, he made several remarks about stakeholder integration. On "knowledge of stakeholders" he said:

> [i]t is a big project, and under the name of famous developers and contractors who are known in the market. It is under the eyes of everybody, so we will not have any financial problem as per my view. So there is a kind of trust.

2.2 Stakeholder interactions

"Stakeholder interactions" was the predominant dimension mentioned by the different stakeholders (116 codes). The contractors and the design team frequently mentioned it in the interviews. The design manager (#11) emphasized the importance of educating stakeholders, he mentioned:

> [t]he most challenging aspect in dealing with stakeholders is probably education. There's been a lot of stakeholders that we have dealt with that haven't understood sustainability or had a very one-dimensional view of sustainability that we've had to educate and bring some open minds to the table.

The contractor (#10) however, similarly pointed out the importance of frequent coordination and communication between them and the other stakeholders, especially the consultants and said, "[t]he consultant and contractor are always meeting to get the best outcome out of the project."

The leaders also highlighted that importance of choosing appropriate strategies to deal with stakeholders and to identify their degree of satisfaction. F, the owner of the project, stated:

> [t]he authorities were very supportive of the concept and we did not have many problems while dealing with them. I tried to convince them through negotiations and dialogue. I tried to address each authority by myself and know their requirements.

Consultants, suppliers and other administrative workers also provided various ideas and observations about the issue such as "we can discuss it if they want to change and do anything, we do it as per their requirements" #15, the supplier.

2.3 Behaviours adaptation

The design team noted behaviours adaptation predominantly. Interviewee #5 pointed out the technique that she is accustomed to adapting to stakeholders' behaviour, she said, "So the only technique that I need to, to deal with them, is patience." And another design team member (#3) discussed that sometimes they need to change their objectives in line with stakeholders' demands, he mentioned:

> [t]he grey-water is being recycled onsite; the black-water isn't. That was one of the things that DM didn't not allow. So in the end, we agreed to give them our black-water and they gave us treated sewerage effluent in return.

The contractors also commented on issues related to this dimension, for example #10 said:

> …the steel structure of the solar panels was all brown and we have implemented more than 100 units, suddenly the municipality told us that they want it to be white. We tried a lot to convince them but they did not agree with us, so we lost money and changes the color according to their demand. But its ok, maybe it's for the general good.

Consultants and leaders explained how they adapt to stakeholders demands and develop their policies and priorities accordingly, the co-founder (#8) said, "We are interested to get their products and best price. And then they are interested in sponsoring our project or to give us best price for their future business." Suppliers and other administrative positions also gave similar accounts.

At the end of this coding process, the following coding agenda was developed to guide coding in order to categorize text into positive, negative and neutral views of stakeholder integration:

Table 6-13: Coding agenda for SI

Category	Value	Definition	Anchor examples	Encoding rules
Stakeholder integration	(+) Positive stakeholder integration	A positive ability to create positive collaborative relationships with a wide range of stakeholders i.e. -Knowledge of stakeholders -Stakeholders interactions -Behaviours adaptation	"the best way is always address all these issues related with the government in early stage and not wait till the last minutes and say "Oh I need to get this approval now." That's why I have a team to plan all of this." "we have engaged with lots and lots of local suppliers for supplying things for the villas."	All three aspects of the definition must be "positive" at least no aspect should allow the judgment of a neutral stakeholder integration; otherwise encoding for "neutral stakeholder integration"
Stakeholder integration	(-) Negative stakeholder integration	The disability to create collaborative relationships with a wide range of stakeholders i.e. -No or poor knowledge of stakeholders -No or poor Stakeholders interactions -No or poor behaviours adaptation	" but I don't usually share them because I know that they wouldn't accept them due to cost and risk." "The way it happens here, they change the designs, modify the lump sum, and they want to start as quickly as possible. The design is not ready but they send it for bidding then they change."	All five aspects point to negative stakeholder integration; otherwise encoding for "neutral stakeholder integration"
Stakeholder integration	(0) Neutral stakeholder integration	There is no clear stakeholder integration act.	"Also usually there is no trust between the consultant and the contractors."	Not all five aspects point to positive or negative stakeholder integration acts.

The table below summarises the coding of Case 1 interview transcript text into positive, negative and neutral categories of comments on stakeholder integration.

Table 6-14: Stakeholders' remarks about SI- SC case

Type of stakeholder	Negative stakeholder integration remarks	Positive stakeholder integration remarks	Neutral stakeholder integration remarks
Consultants	4	15	6
Contractors	5	40	4
Leaders	0	22	1
Design team	4	42	3
Suppliers	0	4	1
Others	1	8	1
Total	14	131	16

The table shows that there are different remarks made about stakeholder integration; however, the most prevalent are positive ones. The design team had the most positive comments (42 codes) followed by the contractors, the leaders, the consultants, the other administrative positions, and then the supplier. The consultants, contractors, design team and others gave a total of 14 negative remarks. Moreover, the different stakeholders gave a total of 16 neutral remarks.

The following table represents examples of significant positive, negative and neutral statements by types of stakeholders. The code number identifier of the related dimension follows directly after the quotation.

Table 6-15: Significant statements SI-SC case

Positive significant statements about stakeholder integration	
Consultants	Everybody's cooperating with others. It was not competitive between the different parties; it was helpful (2.2) The good thing that the developer, the chairman, the management of the developer, the consultant, and the contractors, as the managers and owners, they all know each other before the project. They have previous relations and previous experiences (2.1) We have made simulations over softwares and we have taken real-life examples from different kind of families (2.1)
Contractors	If it comes from any subcontractor, for example there is delay in aluminum, then I will directly communicate with civil works. He will coordinate and see what's the problem and push the work and try to resolve the issue (2.2) I have one engineer who has experience dealing with the authorities (2.1) The best way is always address all these issues related with the government in early stage and not wait till the last minutes and say "Oh I need to get this approval now." That's why I have a team to plan all of this (2.2) Sometimes we have direct communication, direct meetings, with the developer. This helps resolve any issues and challenges we face. That's really healthy for both sides. If not all, 90% of the matters are resolved because of this direct communication (2.2) By building relationships with authorities. Today, if I want anything from DEWA, today I apply, tomorrow I go for the approval, in 10 minutes I get it, because I'm dealing with the same person (2.1) Sometimes we can perform the changes they require if they don't contradict with the specifications of the project. For example we can change to position of the door, so its better if we communicate with them before building so that they wouldn't need to pay for the changes (2.3) The coordination and communication played a very important role in the success of this project (2.2)
Leaders	I tried to convince them through negotiations and dialogue. I tried to address each authority by myself and know their requirements (2.2) I needed to create a simple language to make people of different backgrounds and levels understand my concept (2.2) Our main stakeholder was the end user (2.1) Based on previous experiences and conversations with potential end users we considered their needs and tried to develop our plan accordingly (2.1) So if we need a research about energy for example, everyone works, the architect, the engineer, the designer, everyone (2.2) We were doing discussions. My partner and I were leading them to guide and tune what they do (2.2) We are interested to get their products and best price. And then they are interested also to sponsor our project or to give us best price for their future business (2.3)
Design team	So there's lots of things we're doing to try and engage local stakeholders and local peoples for the social aspects of things (2.2) We've had lots of support from our sister company which is called Tadweer, we've engaged a lot with them for trying to find out about the recycling program for the city (2.2) The stakeholders that we like to surround ourselves with and that we truly seem to have positive relationships with are stakeholders that are doing things for mutual benefits (2.3) The team that was put together for the master planning was ex-colleagues of mine, so we have worked together before and I knew they had similar passion (2.1) The most challenging thing in dealing with stakeholders is probably education. There's been a lot of stakeholders that we have dealt with that haven't understood sustainability or had a very one-dimensional view of sustainability that we've had to educate and bring some open minds to the table (2.2) So the only technique that I need to, to deal with them, is patience (2.3)
Suppliers	We inform them clearly about the different systems. Sometimes the contractor will be

	having some level or average for the price (2.2) It is a big project, and under the name of diamond developers and Jeet which is known in the market. It is under the eyes of everybody, so we will not have any financial problem as per my view. So there is a kind of trust (2.1)
Negative significant statements about stakeholder integration	
Consultants	There are a lot of people giving their opinion, and I don't think everybody's qualified to give an opinion, especially in architecture (2.2) If they (contractors) were involved at early stages, they would go: Oh, we will not do it, the span is big, it'll cost more than hard for our workers. This is the way they think. They are traders. Sorry for that, the creativity that they have is limited. They have to be involved in the later stage, after the design is finished, study is done, before the building permit, somehow yes. But not any contractor or not any consultant. If they are qualified, they can check the drawings as coordination (2.2)
Contractors	This miscommunication is mostly happening because of the person who you're dealing with. Their personality (2.2) Sometimes you deal with someone who doesn't have enough experience, or just can not focus on the scope (2.3) Sometimes approvals from different departments are required. This coordination between different departments might go slow because they usually take their time (2.2)
Design team	I found it challenging, for me personally, because I have never dealt with the authorities before (2.2) I found it personally challenging that once specifications are set, they need a constant follow up (2.2) So the negative part of the stakeholders is those people that were trying to disprove us (2.2)
Neutral significant statements about stakeholder integration	
Consultants	Then we started doing the master plan, we took the requirements from the client - what he was exactly thinking about - the facilities required by the government from Dubai municipality to have one last check (2.2) You know, the project is big to be done all by one consultant. We consolidated the 500 villas and took all our time, all our efforts, all our staff for almost eight months (2.2) As a consultant, you cannot push anyone. They are the higher level. They are the client. Then consultant, then contractor, then so on. As a category they are the top of the pyramid (2.1)
Contractors	If it is under the DM regulation we will try to improve but if it jumps from their regulation we will not do it, we will not even talk about it (2.3) I worked on 10 projects in Dubai, 10 times, the same person from DM. So if you have any personal issues, he will remember you (2.1)
Leaders	We had two consultants who also worked with us within the team (2.1)
Design team	Once we have their signature, we then go to the Dubai Municipality and deal with them (2.2) We used to have a plan before the construction started, materials, schedules, contacts, stakeholders etc (2.1)
Suppliers	This is the first time that we are working with them (2.1)

As shown in the table above, the main positive remarks addressed all three of the stakeholder integration dimensions:

- Knowledge of stakeholders
- Stakeholders interactions
- Behaviours adaptation

On the other hand, negative remarks were made primarily on aspects related to stakeholders' interactions (2.2). These can be summarized in the following points:

- The miscommunication between the different stakeholders.
- The disqualification of the opinions of some stakeholders.
- The negativity and disapprovals of some stakeholders.
- The slow responses and routine work from some stakeholders.

Another negative remark relates to the behaviours adaptation dimension, which is the inexperience of some stakeholders and the slow adaptation to learn and keep up with the project.

6.3.4.3 Category 3: Team identity (TI)

To understand the effect of stakeholder integration and leadership on the team's identity, a number of interview questions were presented to the different stakeholders. The major dimensions, established in the literature, were considered when developing the questions. Team identity is usually studied through two perspectives, team identity at an individual level, and team identity at a team level. The following table illustrates the dimensions and the related questions that were presented to the leaders and to the team to be able to interpret and comprehend their influence on the other key constructs of this research.

Table 6-16: Interview questions related to the TI dimensions

Dimensions of team identity	**Leaders**	**Team**
Team level:		
Boundary clarity		
Boundary permeability		
Cohesion		
Common language and understanding		
Cooperative working atmosphere		
Cognitive similarity		
Individual level:		
Self-categorization		
Evaluation		
Importance		
Attachment and sense of interdependence		
Social embeddedness		
Behavioural involvement		
Content and meaning		

Due to the similarity of the type of questions that address each dimension, a number of comprehensive questions were asked instead of just one specific question for each dimension. This decision was made to provide interviewees the opportunity to express the issues freely without experiencing too much control from the interviewer.

To revise and approve the salience of the dimensions of the category, the following charts illustrate the number of coding references in each dimension for team identity at a team level and at the individual level.

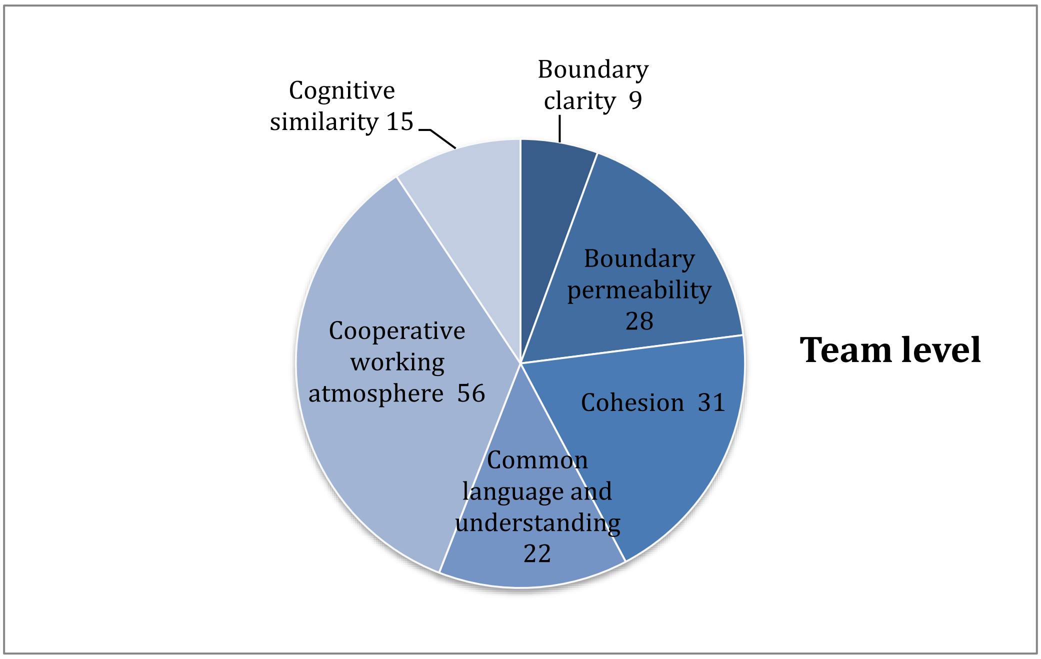


Figure 6-11: Number of coding references of team level TI dimensions- SC case

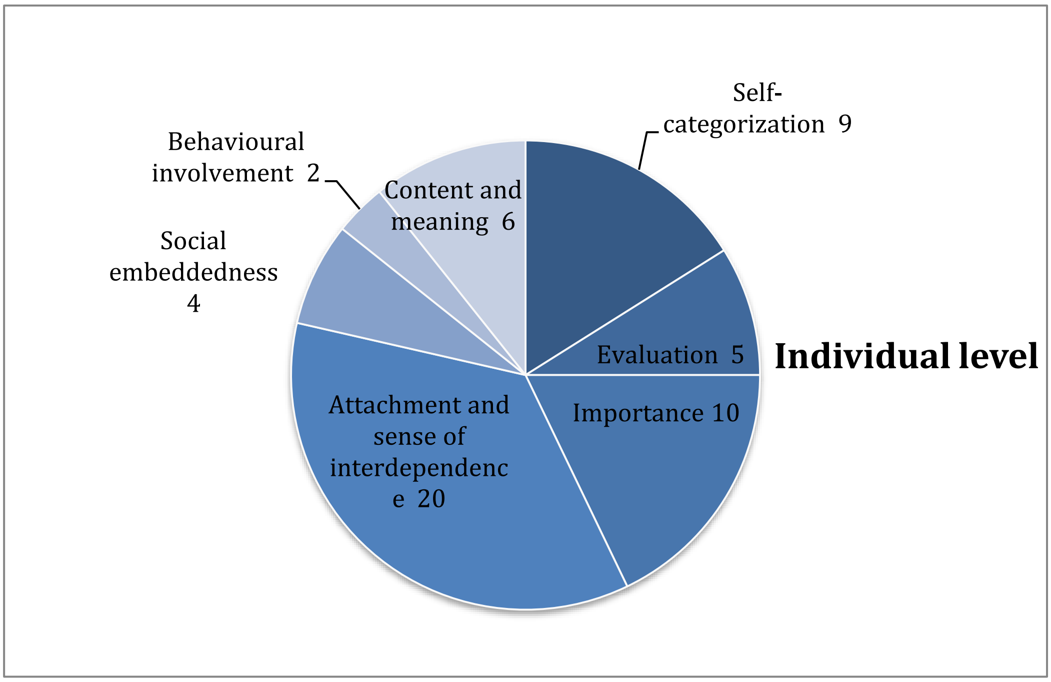


Figure 6-12: Number of coding references of individual level TI dimensions-SC case

The interviewees varied in the ways that they mentioned the different dimensions for both the team level and the individual level of team identity, but they were all covered without the exclusion of any specific dimension. The coding references for each dimension varied from 9 to 56 instances at the team level and from 2 to 20 at the individual level. The researcher decided to retain all of the dimensions at this stage including keeping “behavioural involvement” which had only 2 references and “social embededness” which had only 4 references at the end of the analysis of the different cases. The rest of the reference numbers indicates the reliability of the dimensions in terms of frequency of mention and states the research questions that are related to them.

The conversation about team identity with the different interviewees produced 217 related passages, with contributions from 16 out of 16 interviewees. This category was subdivided into 6 dimensions at the team level and 7 dimensions at the individual level. The dimensions profile in Table 6-17 further elaborates the type and frequency of responses amongst the dimensions in terms of the different types of stakeholders.

Table 6-17: Dimension profile, TI- SC case

	Consultants	Contractors	Leaders	Design team	Suppliers	Others	**Total**
Team level:							
3.1 Boundary clarity	1	3	0	4	0	1	**9**
3.2 Boundary permeability	4	12	0	10	0	2	**28**
3.3 Cohesion	4	6	2	13	1	5	**31**
3.4 Common language and understanding	1	7	5	9	0	0	**22**
3.5 Cooperative working atmosphere	7	21	5	18	1	4	**56**
3.6 Cognitive similarity	1	3	3	6	0	2	**15**
Individual level:							
3.7 Self-categorization	0	1	1	5	0	2	**9**
3.8 Evaluation	0	1	0	3	0	1	**5**
3.9 Importance	4	0	0	5	0	1	**10**
3.10 Attachment and sense of interdependence	5	2	2	9	0	2	**20**
3.11 Social embeddedness	0	1	0	2	0	1	**4**
3.12 Behavioural involvement	0	1	0	1	0	0	**2**
3.13 Content and meaning	1	0	2	2	0	1	**6**
Total	**28**	**58**	**20**	**87**	**2**	**22**	**217**

Team level

3.1 Boundary clarity

Boundary clarity is the least mentioned dimension at the team level (9 codes). Consultants, contractors, design team and the administrative positions mentioned it in their conversations while leaders and suppliers did not. The interviewees chiefly reflected on this dimension by mentioning one major aspect, which is the knowledge of each ones' responsibility and duties towards the innovation. For example, the contractor, #10, mentioned, "everyone should clearly know his duties and responsibilities.” While the design manager, #3, said, “the three of us plus the other guy who left, we were the core team that were here from the very beginning.”

3.2 Boundary permeability

This dimension was mentioned frequently (28 codes). The leaders and the supplier did not make any comments about it though. Others such as the design team and the contractors mentioned it often. Many of the interviewees reflected on this dimension by revealing aspects such as the close exchange and communication with other teams and the links with other teams. For instance, the contractor #10 said, “[t]here are weekly coordination meetings. Everyone is updating his works and what he needs from other departments. And that's why we link, I link all of them through this meeting, and through the, the day-to-day communications.”

They also reflected on this dimension through mentioning the access they have to contacts with relevant expertise concerning the innovation project. For example, the design manager, #11, said, “[w]e've had great support from various consultants that we've worked with in the past and that we trust. So it's been a good combination of youthful ideas and experienced technical team.”

Moreover, they raised aspects related to having good access to decision-makers who are important for the innovation project. The contractor, #10 mentioned, “I mean if I have something in the project, I can push it. I can speak with the developer directly, it will be resolved immediately.”

3.3 Cohesion

Cohesion was articulated by all of the interviewees producing 31 codes. The consultant, #12, discussed the integration of all team members and the personal affinity amongst them and said, “so we all work together, and we help each other and we handle problems internally. We don’t have boundaries, we hang out together after work, so we don't have any limits.” The cofounder, #8, acknowledged the fact that there is a strong tie between the team members and the project and said, “There is a strong tie between team members and the project.” A design team member also made a similar comment saying, “we grew very fond of each other over the years”.

All of the interviewees related team identity to this aspect, and even the supplier who did not comment much on the topic mentioned, “And the relationship with the contractors and consultants are very good so we are quite satisfied with what we do here” which indicates their satisfaction to be part of the team.

3.4 Common language and understanding

This dimension was frequently mentioned by some categories of stakeholder while it was not mentioned at all by others. Suppliers and administrative position employees did not allude to it at all while consultants made only one comment on it. A consultant, #12, thought that technicality is the common language when talking about the solar panels and said, “…those companies have been working with the market worldwide. Dubai is like a new market for them, but we haven’t faced cultural or language issues because our conversations were purely technical.”

In contrast, other interviewees mentioned the conflicts that might arise due to language and cultural barriers. The design manager, #11, mentioned, “I'm from

Canada and I only speak English. So, there's been several things, there's has been a language barrier and there's also a cultural barrier that has to come through."

The leader said that he felt responsible for creating a common language that everyone could understand to make them more aware of his ideas and concept, he stated, "I needed to create a simple language to make people of different backgrounds and levels understand my concept."

3.5 Cooperative working atmosphere

A cooperative working atmosphere was the predominant dimension (56 codes). Many of the interviewees mentioned aspects related to the cooperative and communicative working atmosphere in the project. For example, the consultant, #12, said, "It's a good relationship; a very friendly environment, no restrictions, no limits. We are mostly friends, we exchange ideas, get excited about them and work on proposing them to the management." The lead architect from the contracting company added, "we don't have any strict separation between the developer and the contractor. We are working together; each member of the contractor is like a member of the developer."

The leader noted that bringing the team together to express their ideas freely is very important for the sake of the innovation, he mentioned, "so if we need a research about energy for example, everyone works, the architect, the engineer, the designer, everyone." The design manager also reflected on this aspect and said:

> …so everyone brings different ways of working into the office. Each person has strength in different software or in a certain style of working. But probably, the biggest thing we did was, make all those things common, so we adopted a common way of working and a common file system and a common program that we used.

Other interviewees noted how important it was to feel free and confident to express ideas for the sake of the innovation, the sustainability engineer from the design team, #4, said, “we used to sit down here in the meeting room and just brain storm ideas on how we can fully integrate sustainability into the project.”

3.6 Cognitive similarity

This dimension was not mentioned very frequently. Each type of stakeholder gave a few remarks on this issue and the supplier did not mention anything about it. The interviewees mostly related this dimension to having similar opinions and beliefs. The design manager, #11, said “I found the best way to get things started was to have some commonalities in the way we work.” He added, “The stakeholders for the master plan design had to keep people that, um, share a common vision.”

The contractor pointed out that sharing the same belief system with the developer helped to make the project happen. He said, “We have the same belief system as the developers.” The owner believed in creating an environment with shared vision and interest to make the project successful. He mentioned, “I hired some junior graduates that were very motivated and believed in the project.” He also stressed the importance of having similar interests with the partners and noted “He (his partner) was very excited about the idea and reminded me of how we used to dream to build something unique and useful back in school.”

Individual level

3.7 Self-categorization

The design team was the main group that mentioned self-categorization; other interviewees only made 1 or 2 remarks about it. The consultants and the supplier did not give any comments. The design team highlighted it through placing members in a specific category and relating themselves to it. For example, #11 said, “[f]or those people who have stayed, they feel like they're part of a family like me. I think the people that have no commitment to our passion for sustainability have left.”

The lead architect, #3, mentioned that the project becomes part of the identity of the individual and that the individual feels related to it. She said, “…whether you like it or not, it'll become a part of your identity.”

3.8 Evaluation

Only 5 remarks were related to evaluation made mainly by the design team. They reflected mainly on their self-esteem through statements such as, “[i] don't need much motivation from top management. I'm self-motivated, in that sense” mentioned by #2 and “[h]e believed in us and we wanted to prove that he was right to believe in us” mentioned by #3.

3.9 Importance

A sense of importance was noticed in two stakeholder groups, the consultants and the design team. Other groups, with only one exception in the administrative positions, only mentioned the importance of the concept and the project and not the importance of being part of the team. The design team repeatedly mentioned how important it is and how proud they felt to be involved in the project, #3 said, “[y]ou feel a sense of pride and a sense of accomplishment to be involved in this project" and #4 gave similar remarks and mentioned, "i feel very proud that we were able to achieve this project from a conceptual design and now it's on site and it should be ready by the end of next year."

The consultants expressed similar views on importance to the design team, #12 said, "… it's a promising future. I'm working with photovoltaic plants and what matters in my job is to save fuel resources. It means saving the future for the next generation. It is a very nice experience."

3.10 Attachment and sense of interdependence

This dimension was the most frequently mentioned dimension under the individual level for team identity (20 codes). It was mentioned by all of the different groups of stakeholders except for the supplier.

The interviewees reflected on this dimension through explaining their feelings about being part of the team and the project, for example a member of the design team, #3, said, "I don't think that I will ever find a CEO in another company that I work with as well as I did with Mr F." The consultant also articulated a sense of attachment and said, "it's been very enjoyable to be a part of that learning process with the management and to help them sometimes with the learning of different things." Others, such as the contractor, reflected on this dimension through describing behaviours that demonstrate effective commitment to the project, he said, "sometimes I go and try to find items and materials by myself something as small as a plant that is good for landscaping.” Some interviewees also revealed a sense of common fate, for example #5 mentioned:

> I need to see how it will look like. I saw everything, how they applied the rough foundation, the construction, and the walls on the villas. So I'm just waiting, like the owners, for the opening day of the project, you know.

3.11 Social embeddedness

The interviewees only gave 4 remarks about social embeddedness. The dimension was reflected through mentioning how the collective identity of the team influences their routine weekly activities, for instance, #5 said, “every weekend, all of us, we have lunch together.”

3.12 Behavioural involvement

This dimension was the least frequently mentioned by the interviewees (2 codes). A design team member and the contractor reflected on it through their engagement in actions that directly implicate the collective identity of the team. The sustainability engineer, #5, reflected that sustainability became part of his life and that he spreads the knowledge he gained through the project to his family and friends, he said, “So I now have a lot of experience in terms of sustainability so when I sit with people I feel that on a personal level I can influence people to make small changes in their lives to lessen the harm on the environment.”

3.13 Content and meaning

Interviewees that reflected this dimension mainly expressed some narratives about the internally represented story that they have developed regarding self and the team. For example, #11, the design manager said:

> I think now that we're near the end of the project, it, it feels really nice to have been a part of it and to have seen how we've all evolved as a team and management all the way through to the construction phase.

While #12, a consultant, expressed how it means to him to be part of a team that can influence the wellbeing of the future generations.

At the end of this coding process, the following coding agenda was developed to guide the analysis process and categorize the text into positive, negative and neutral views of team identity:

Table 6-18: Coding agenda for TI

Construct	Value	Definition	Anchor examples	Encoding rules
Team identity	(+) Positive team identity	The feeling of belonging of individuals that create some emotional and value significance to them and a sense of membership at a group level and an individual level i.e. At a group level: - Boundary clarity - Boundary permeability - Cohesion - Common language and understanding - Cooperative working atmosphere - Cognitive similarity At an individual level: - Self-categorization - Evaluation - Importance - Attachment and sense of interdependence - Social embeddedness - Behavioural involvement - Content and meaning	"They feel like they're part of a family. I think the people that have no commitment to our passion for sustainability have left." "Saving fuels means saving the future for the next generation. And, for me, and it is a very nice experience." "Yeah, I think this is the future, and when you enter the future by working on the first sustainable city in Dubai, it is something to be proud of."	All of the aspects of the definition must be "positive" at least no aspect should allow the judgment of a neutral team identity; otherwise encoding for "neutral team identity"

Team identity	(-) Negative team identity	No feeling of belonging of individuals to the project, no emotional and value significance to them, and a poor sense of membership at a group level and an individual level.	"But many subcontractors they don't care. They are just focusing on the work that they are doing, and the payments, and the delivery purpose." "I don't have anybody here, I work by myself, even a secretary. I am doing my paper work, my variations, my payments, everything."	All aspects point to negative team identity; otherwise encoding for "neutral team identity"
Team identity	(0) Neutral team identity	There is no clear positive or negative team identity act.	"I work on a number of projects, each project is special to me, I give it my attention. Do I belong? Yes I guess, because I could always see my input to it. When I pass by it, I feel proud that I am part of this project. But is it special? I would say not necessary. I see it as any other project."	Not all five aspects point to positive or negative team identity

The table below is the result of coding to categorize text into positive, negative and neutral interviewees' remarks about team identity in Case 1.

Table 6-19: Stakeholders' remarks about TI-SC case

Type of stakeholder	Negative team identity remarks	Positive team identity remarks	Neutral team identity remarks
Consultants	0	14	0
Contractors	0	26	3
Leaders	0	11	0
Design team	3	44	2
Suppliers	0	1	0
Others	0	18	0
Total	3	114	5

It is evident from the table that there are different remarks made about team identity; however, the dominant ones are positive. The design team expressed the most positive remarks (44 codes) followed by the contractors, the consultants, the leaders, the other administrative positions, and then, the supplier. The design team was the only stakeholder group that had made negative remarks about team identity (3 remarks). Moreover, the design team and the contractors gave a total of 5 neutral remarks.

The following table represents examples of significant positive, negative and neutral statements by the different types of stakeholders. The code number of the related dimension follows each statement.

Table 6-20: Significant statements about TI-SC case

Positive significant statements about team identity	
Consultants	I think this is the future, and when you enter the future by working on the first sustainable city in Dubai, it is something to be proud of (3.9, 3.10) I'm working with photovoltaic plants and what matters in my job is to save fuel resources. Saving fuels means saving the future for the next generation. And, for me, and it is a very nice experience (3.13) We all work together, and we help each other and we handle problems internally. We don't have boundaries, we hang out together after work, so we don't have any limits (3.2, 3.3) It's a good relationship. It's a very friendly environment actually. No restrictions, no limits. We are mostly friends and we exchange ideas and get excited about them and work on proposing them to the management (3.3) The cooperation between all the parties. Everybody's cooperating with others. It was not competitive between the different parties; it was helpful (3.3) Actually those companies, they have been working with the market worldwide. So Dubai is like a new market for them, but we haven't faces cultural or language issues because our conversations were purely technical (3.4) I like the teamwork here. They are very helpful. When we think or when we implement. I might have a problem; they can offer solution. It's a very friendly relationship (3.5)
Contractors	Sometimes I go and try to find items and materials by myself something as small as a plant that is good for landscaping (3.12) Everyone should clearly know his duties and responsibilities (3.1) We have weekly meetings, coordination meetings. So we are all together, sitting together, and updating the whole thing. Everybody's updating his works and what he needs from other departments from other engineers. And that's why we link, I link all of them through this meeting, plus the, the day-to-day communications (3.2, 3.5) We don't have any strict separation between the developer and the contractor. We are working together; each member of the contractor is like a member of the developer (3.2, 3.5) My Engineers are like my brothers; my foreman's are my little brothers. We are very friendly together but sometimes you have to be tough. I instruct them in a serious manner, if they do the work, I become friendly with them (3.3) Challenges are not coming from different culture. We do not have a lot of challenges with regard to our staff (3.4) We have the same belief system as the developers (3.4, 3.6) They (the team) share the vision of the developer or the owner of the project (3.6)

Leaders	We ask for opinions of other members and other employees (3.2) They were very much active in creating the ideas, and then doing the design at the design stage. Now, in construction, most of the people are happy and they want to finish on time, and they are creative themselves. We are not pushing anyone, but they are themselves taking the role because they love to see it happen (3.3) We get along very well and we understand each other (3.4) I needed to create a simple language to make people of different backgrounds and levels understand my concept (3.4) There was a lot of collaboration between us and the other stakeholders (3.5) He (the cofounder) was very excited about the idea and reminded me of how we used to dream to build something unique and useful back in school (3.6) I hired some junior graduates that were very motivated and believed in the project (3.6)
Design team	I think now that we're near the end of the project, it feels really nice to have been a part of that and to have seen how we've all evolved as a team and the management all the way through to the construction phase (3.10) I don't think I will ever find a CEO in another company that I work with as well as I did with Mr F (3.10) Now I have a lot of experience in terms of sustainability so when I sit with people, I feel that on a personal level I can influence people to make small changes in their lives to lessen the harm on the environment (3.12) I got to know how to deal with our client, with our subcontractors with our management so I learned and developed a specific kind of personality by doing that (3.8) You feel a sense of pride and a sense of accomplishment (3.9) For those people who have stayed, I think that their motivation is much like mine. They feel like they're part of a family. I think the people that have no commitment to our passion for sustainability have left (3.7) Every weekend, all of us, we have lunch together (3.11) The three of us plus the other guy who left, we were the core team that were here from the very beginning (3.1) So our team has had to learn a lot of different perspectives in order to try and navigate through this and bring it all into one place (3.2) What we have done and what we will continue to do is to be very transparent (3.2) We can like bounce ideas off of each other (3.2) So our team has had to learn a lot of different perspectives in order to try and navigate through this and bring it all into one place (3.3) You want to be a part of this project (3.3) We (the team) grew very fond of each other over the years (3.3) I found the best way to get things started was to have some commonalities in the way we work (3.4) We adopted certain procedures and certain software within the office that we would all work on a common platform (3.5) So everyone brings different ways of working into the office. Each person has strength in different software or in a certain style of working. But probably, the biggest thing we did was, make all those things common, so we adopted a common way of working and a common file system and a common program that we used. And then from there, I think the individualities became strengths (3.5)
Suppliers	And the relationship with the contractors and consultants are very good so we are quite satisfied with what we do here (3.3)
Negative significant statements about team identity	
Design team	I'm from Canada and I only speak English. So, there's been several things, there's has been a language barrier and there's also a cultural barrier that has to come through (3.4) When you get into the construction, end of things, it gets really complicated 'cause you're dealing with many different nationalities and many different work ethics (3.4, 3.6) But many subcontractors they don’t care. They are just focusing on the work that they are doing, and the payments, and the delivery purpose (3.3)
Neutral significant statements about team identity	
Contractors	They have to share; they have to share between each other (3.2, 3.5) They have to work as a team, as a family (3.1, 3.5) They have to focus on what we are trying to do together (3.5)
Design team	You have to be very open to interpreting what you used to do into a new collaborative approach where everyone is working on the same page (3.2) That's probably the biggest dream that I could have for the design managers to have everyone understanding everything at the same level and wanting to work towards that common goal. I cant say that it happened, but that would be, you know, the lessons learned that we would take to the next project (3.2, 3.3, 3.4, 3.5)

As shown in the table above, the main positive remarks provided applied to all of team identity dimensions at an individual level and a team level. Whereas the negative remarks were made primarily on aspects related to cohesion (3.3), common language and understanding (3.4), and cognitive similarity (3.6) that can be summarized in the following points:

- The language and cultural barrier.
- Differences in nationalities and work ethics among stakeholders.
- Lack of interest in innovation by some stakeholders.

6.3.4.4 Category 4: Innovation effectiveness (IE)

To understand how the previously studied categories (leadership for innovation, stakeholder integration, team identity) influence innovation effectiveness, a number of questions were posed to the different stakeholders, in addition to analyzing documents and reports. As was mentioned in chapter 3, in the context of this case study, objective data such as financial information was excluded since the project were under construction at the time of data collection. Therefore, the category is studied through analysing how the project perceives the overall benefit of the innovation. Thus, two dimensions were considered to measure innovation effectiveness, which are the future/expected innovation potential and the effective/efficient innovation capacity.

The major dimensions, established from the review of the literature, were considered when developing the questions. The following table illustrates the dimensions and the related questions that were asked of the leaders and the team.

Table 6-21: Interview questions related to the innovation effectiveness dimensions

Dimensions of innovation effectiveness	Leaders	Team
Future/expected innovation potential		
Effective/efficient innovation capacity		

To revise and approve the dimensions of the category, the following chart illustrates the number of coding references in each dimension for team identity at a team level and at the individual level.

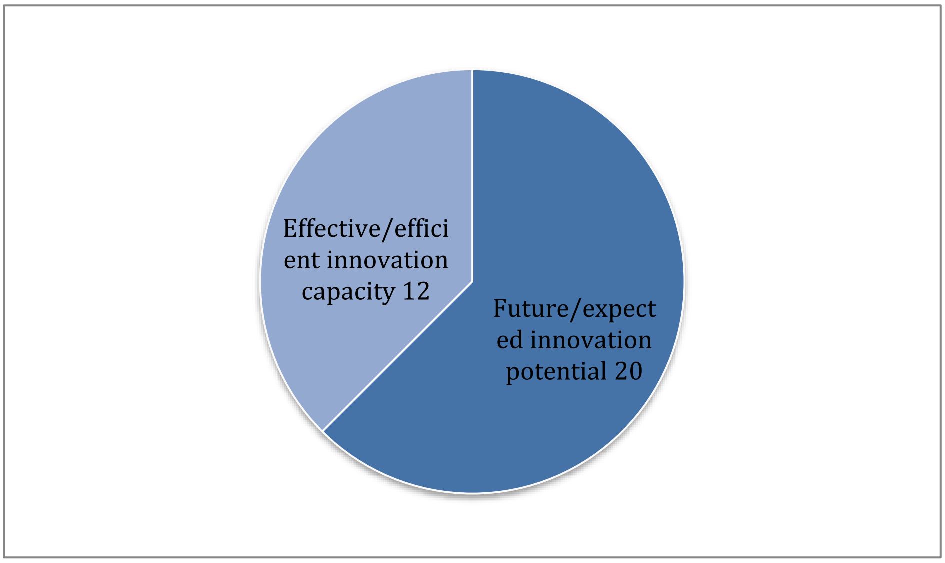


Figure 6-13: Number of coding references of IE dimensions-SC case

Each dimension had an adequate number of coding references that indicated the trustworthiness of the dimensions and the research questions that are related to them. The future/expected innovation potential had more references than the effective/ efficient innovation capacity dimension, which can be explained by the fact that the project was still under construction.

The conversation with the different interviewees produced 32 passages related to innovation effectiveness. Thirteen out of 16 interviewees shared their ideas about this category. The frequency of responses according to the type of stakeholders is elaborated in Table 6-22.

Table 6-22: Dimension profile, category 4, IE- SC case

	Consultants	Contractors	Leaders	Design team	Suppliers	Others	Total
4.1 Effective/ efficient innovation capacity	1	1	4	4	0	2	**12**
4.2 Future/ expected innovation potential	1	4	4	4	0	7	**20**
Total	**2**	**5**	**8**	**8**	**0**	**9**	**32**

4.1 Effective/ efficient innovation capacity

All stakeholder groups except the supplier have made remarks about effective/ efficient innovation capacity. Since the project was still under construction at the time of gathering data, they only reflected on the ongoing achievement of goals within budget and time frame. For example, an architect (#3) said, “and so far, from what we've seen, everything has been going according to plan if not better.” The design manager agreed with the architect in that the project is already achieving its goals, he mentioned, “[i] think that this project has already achieved a huge amount compared to the average residential project in Dubai. So it's already a huge success.” Likewise, the different stakeholders commented that the financial and the environmental aspect is already successful although the social aspect is yet to be assessed

The design manager said, “[i]f we look at sustainability as economic, environmental, and social, it has already achieved economic success and it certainly achieved environmental success from what we're doing here.” The consultants agreed with the design team, #12 said, “[i]t's successful. We’ve overcome a lot of barriers since the beginning of the project and worked very well together to implement it and now it’s achieving its goals financially and environmentally.” The contractor shared a similar view as well, he mentioned:

> [i]n my opinion, in terms of the environmental or social aspects, I think that the project is already successful. It's hitting a lot of goals. Even at the level of the organizations and team, they are very successful and the developers did a great job in that.

The leader gave a detailed explanation about the measurement of the effectiveness of the project he elaborated that they looked at different aspects to measure the effectiveness of the project, financially, environmentally and socially. In addition to that, they measured the success of the project in terms of the administration and engineering aspects as well. He said, “[w]e consider the performance in engineering very good because we had the experience. We are not only developers, we are also architects and engineers.” And in terms of administration he mentioned, “the performance was good since we hired the right people at the right position. And we managed the project within a good period of time.” He added that they also managed to reduce the cost of the construction because of their experience in previous developments, hence, achieving good financial benefit. He also mentioned that they attracted customers by reducing the rate of the units to make it less than the market rate. He pointed out, “we are providing them a good unit with a lot of benefits and with fewer prices. So financially, we are performing very high.” In addition to that, he reflected on the social aspect by mentioning the general satisfaction and encouragement from professionals, university professors in addition to establishments like the UN. He said, “[t]hey were very happy about the project, and encouraged us.”

In terms of the environment, he mentioned that they were doing very well by stating that, “[w]e are leading the market and people are following us.”

4.2 Future/ expected innovation potential

All stakeholders except for the supplier discussed the future innovation potential of the project. They see a successful future and a high quality project that will result in satisfied residents. A design team member mentioned that they under promise and over deliver, they never promised to do anything in the city that they weren’t sure they can deliver and that is what would make their project successful, she said, “To set your aims very high, but also be realistic in the sense that don't over promise and then under deliver, because that's when people will see that their project is a failure.”

Another design team member reflected that the success of the project is related to the social benefit that the resident would have by getting together and socializing in a friendly environment along with the financial benefit that they would have because they will not need to pay for maintenance or service fees, he said, “So once all these things are up and running and it's truly unique, then that's the success of the project.” He also added, “if we show that we're really efficient, innovative, and reducing our impact on the environment, and people are happy to live there, then that's the success of the project.”

The design team members pointed out an interesting aspect to make their project even more effective, which is the ability to educate others about sustainable developments and provide the academic components to develop such projects. Interviewee #2 said, "If you want to learn about sustainability, there are all these academic components to the project."

The contractors presented similar ideas on the issue, #9 said:

> [w]hen they will live in the city, they will share the same ideas, they will share the same habit of living. They will be aware of where they are living and how sustainable it is. So, this will bring success, and we are going to maintain this success continuously.

The consultant thought that the luxury of the materials used in the villas is another strong point to add to the sustainability aspect, so it's not only sustainable but it is also luxurious which adds a point to its success. He stated, "the good thing that the owner did is good marketing, he is a smart guy, he went for luxury materials in the villa. So people will not say it's sustainable and cheap." He added that it is difficult to judge if it is successful until the project is finished but so far they are satisfied with the results. "you cannot say it's successful until its finished because it's a community. And you need to judge after the community as a whole is finished. But until now it is successful."

The leaders were very proud and satisfied with their project and they thought that the residents will realize that once they move to the city. The cofounder (#8) said:

> [o]nce people live in the city, they will experience and get a feeling of the sustainability aspects. Economically, they will feel it when they save money. Socially, they will feel it when they live there. They will feel how much social interaction will exist because of the social activities provided in the community. Environmentally, they will feel it when they will save energy and reduce the use of cars and grow their own organic food and all of the sustainable aspects that the city offers.

The owner, FS, stated that the environmental and financial aspects were already successful and effective. He had high hopes for the social aspects though because according to him, human behaviour is unpredictable, and he would only be satisfied if he witnesses the change in human behaviour towards achieving sustainability. He mentioned, “ I really want to see a change in human behaviour after living in the city, I want to see more considerate people who are aware of sustainability.”

At the end of this coding process, the following coding agenda was developed to guide coding in order to categorize text into positive, negative and neutral views of innovation effectiveness:

Table 6-23: Coding agenda for IE

Construct	Value	Definition	Anchor examples	Encoding rules
Innovation effectiveness	(+) Positive innovation effectiveness	A positive perception of the overall benefit of the innovation i.e. - Positive future/expected innovation potential - Effective/efficient innovation capacity	"I think that this project has already achieved a huge amount compared to the average residential project in Dubai. So it's already a huge success" "In terms of meeting the budget and the time frame, it is. The 3D paneling is also working very well and it actually reduced the time and cost as claimed by the contractor."	All aspects of the definition must be "positive" at least no aspect should allow the judgment of a neutral view; otherwise encoding for "neutral innovation effectiveness"
Innovation effectiveness	(-) Negative innovation effectiveness	A Negative perception of the overall benefit of the innovation i.e. - Negative furture/expected innovation potential - Poor innovation capacity	"I'd say that everything that we'd proposed meets best practice, but there's no particular new innovations." "There is nothing which is ground-breaking innovation. It is all pretty standard."	All aspects point to negative innovation effectiveness; otherwise encoding for "neutral innovation effectiveness"
Innovation effectiveness	(0) Neutral innovation effectiveness	There is no clear perception of the benefit of the innovation	"The financial aspect is not clear yet, we have to wait until we finish the last phase of the project."	Aspects of innovation effectiveness do not point to positive or negative perception.

The table below shows the positive, negative and neutral interviewees' remarks about innovation effectiveness in Case 1.

Table 6-24: Stakeholders' remarks about IE-SC case

Type of stakeholder	Negative innovation effectiveness remarks	Positive innovation effectiveness remarks	Neutral innovation effectiveness remarks
Consultants	0	2	0
Contractors	0	4	0
Leaders	0	7	3
Design team	0	7	1
Suppliers	0	0	0
Others	0	5	3
Total	0	25	7

It is apparent from the table above that there are only positive and neutral remarks made about the effectiveness of innovation and there are no negative remarks by any of the different stakeholder groups. The positive remarks are dominant (25 codes) given by the different types of stakeholder groups with the exception of the supplier. The following table represents examples of significant positive, negative and neutral statements by the different types of stakeholders. The number of the related dimension follows each statement.

Table 6-25: Significant statements about IE- SC case

Positive significant statements about innovation effectiveness	
Consultants	We have overcome a lot of barriers since the early stages of the project and worked very well together to implement it and now it is actually achieving its goals financially and environmentally (4.1) The good thing that the owner did is good marketing, he is a smart guy, he went for luxury materials in the villa. So people will not say it's sustainable and cheap. They know its luxury. You cannot say it's successful or not until its finished. Because it's community. And you need to judge after the community as a whole is finished. But until now its successful (4.2)
Contractors	In my opinion, in terms of the environmental or social aspects, I think that the project is already successful. It's hitting a lot of goals, in my opinion. Even at the level of the organizations and team, they are very successful and the developers did a great job in that (4.1) It is a city; everybody who is joining is coming for the same purpose, sustainability. This is something really important. When they will live in the city, they will share the same ideas; they will share the same habit of living. They will be aware of where they are living and how sustainable it is. So this will bring success, and we are going to maintain this success continuously (4.2)
Leaders	There are different aspects that we have to look at to measure the effectiveness or the success of the project, finally, environmentally and socially. Then there is the administration and engineering aspect as well. The performance in engineering, we consider it very good because we had the experience. We are not only developers, we are also architects and engineers, so the performance in engineering for this development was at an adequate level - at higher level, you can say. About the administrative aspects, the performance was good since we hired the right people at the right position. And we managed the project within a good period of time. Financially, we managed to reduce the cost of the construction because of our experience in previous developments. So we selected materials and contractors according to our experience. We got the best prices in constructing the project and we reduced the cost as much as possible. And also for the prices of the selling units, we tried to attract people by reducing our rate to make it less than the market rate. So we are providing them a good unit with a lot of benefits and with

	fewer prices. So financially, we are performing very high. The social aspect is also very good. We have encouragement from a lot of people who visit us like professionals and professors in addition to establishments like the UN. They were very happy about the project, and encouraged us. So I can say we are doing well in all of these aspects, and in terms of sustainability we are leading the market. We are leading other developers in sustainability, and I believe they are following us. (4.1) Once people live in the city, they will experience and get a feeling of the sustainability aspects. Economically, they will feel it when they save money. Socially, they will feel it when they live there. They will feel how much social interaction will exist because of the social activities provided in the community. Environmentally, they will feel it when they will save energy and reduce the use of cars and grow their own organic food and all of the sustainable aspects that the city offers (4.2) I want to have to achieve social sustainability is the human behaviour and attitude towards sustainability. I really want to see a change in human behaviour after living in the city, I want to see more considerate people, people that farm and eat organic, people that take the electrical shuttle, people that ride bicycles, that recycle and reuse and that's why I think that the sustainable school that I have included in the project is very important to produce kids with such sustainable mentalities (4.2)
Design team	I think that this project has already achieved a huge amount compared to the average project, residential project in Dubai. So it's already a huge success (4.1) If we look at sustainability as economic, environmental, and social, it has already achieved economic success. It's certainly achieved environmental success from what we're doing here (4.1) The social success is probably the hardest thing to measure and the biggest variable that we can't control in the future. So we can promote education and we can promote social awareness to environmental programs, but it's your job now to actually take this city and these people and make them live sustainably. So that's, that's going to be the next level of success that I would like to see is to be able to like several years from now and come back and view, and have a reexamination of what we've done and see, from the social standpoint how successful it's been (4.2) And now, it's a case-- I always say that, that I think the children, so the children that go to school in our sustainable green school here from kindergarten to grade eight, they will probably be the biggest instrument for social change. I think those kids will be the biggest catalyst for the social change in the community (4.2) We want people to learn from our project so that if you want-- if you're a developer and want to do something similar, you can, and we're proving that it's possible. If you want to learn about sustainability, there's all these academic components to the project (4.2) So far they have managed to live up to everything that they've promised (4.1) Everything has been going according to plan if not better (4.1) I think our slogan should always be that we under promise and over deliver. We did not promise to do anything in the city that we didn't think that we weren't sure we were able to deliver. And I think that's what will make it successful. To set your aims very high, but also be realistic in the sense that don't over promise and then under deliver, because that's when people will see that their project is a failure (4.2) It's a place where people get together, they like where they live, and they like each other. It's a place where you're saving out of things. You own a house but you don't have to pay for maintenance and service fees because you have shared revenue in the community side, community mall. So once all these things are up and running and it's truly unique, then that's the success of the project, you know? So if we show that we're really efficient, innovative, and reducing our impact on the environment, and people are happy to live there, then that's the success of the project (4.2)
Suppliers	N/A
Negative significant statements about innovation effectiveness	
N/A	
Neutral significant statements about innovation effectiveness	
Contractors	The financial aspect is not clear yet, we have to wait until we finish the last phase of the project (4.2)
Leaders	We aim to have savings and surplus from the project and this would achieve its financial sustainability (4.1)
Design team	What will make it successful is if it really does reduce its impact on the environment, and if it proves to have been this unique project in terms of implementing the three components of sustainability (4.2) So if we really like can show that we're really efficient, innovative, and reducing our impact on the environment, and people are happy to live there, then that's the success of the project (4.2)

As shown in the table above, positive remarks were dominant while discussing the two aspects of innovation effectiveness, future/expected innovation potential and effective/efficient innovation capacity.

6.3.5 Case1 (SC case) summary

The SC case findings reveal that the dominant interviewees' remarks were positive in all study categories. There is a general admiration and satisfaction about their leader who had been seen as a motivational, inspirational and idealistic leader. Stakeholders were integrated successfully according to the interviewees' remarks; there was a systematic way of identifying them, studying them, coordinating with them, and adapting to their behaviour accordingly. The innovation team revealed a strong identity at team and individual levels. The innovation was reflected on by the interviewees as being effective in terms of efficiency and the future expected innovation potential. There were some minor challenges in stakeholder integration and team identity that were tackled for the sake of improving the project and increasing its likelihood of successful innovation.

Consultants, contractors and the design team were the main stakeholder groups that faced some challenges with stakeholder integration while the design team was the only one that provided accounts of some negative aspects about team identity.

The following table illustrates stakeholders' perceptions about the study categories.

Table 6-26: Stakeholders' perceptions about the conceptual model categories (+ for positive, - for negative)

Type of stakeholder	Leadership for innovation	Stakeholder integration	Team identity	Innovation effectiveness
Consultants	+	+, -	+	+
Contractors	+	+, -	+	+
Leaders	+	+	+	+
Design team	+	+, -	+, -	+
Suppliers	N/A	+	+	N/A
Others	+	+, -	+	+

Table 6-27 illustrates that the most discussed dimension was stakeholder interactions and the least mentioned one was behavioural involvement. It also shows that aspects related to the individual level of team identity were the least mentioned dimensions.

Table 6-27: The perception of the different categories and their dimensions- SC case

Conceptual thematic framework	Number of coding references	Perception
1. Leadership for innovation		
1.1 Encouraging and stimulating innovation	21	+
1.2 Providing and inspiring vision	22	+
1.3 Individualized support	18	+
1.4 Teamwork development	28	+
1.5 Stakeholder integration	15	+
2. Stakeholder integration		
2.1 Knowledge of stakeholders	46	+
2.2 Stakeholders interactions	116	+, -
2.3 Behaviours adaptation	43	+
3. Team identity		
Team level:		
3.1 Boundary clarity	9	+
3.2 Boundary permeability	28	+
3.3 Cohesion	31	+, -
3.4 Common language and understanding	22	+, -
3.5 Cooperative working atmosphere	56	+
3.6 Cognitive similarity	15	+, -
Individual level:		
3.7 Self-categorization	9	+
3.8 Evaluation	5	+
3.9 Importance	10	+
3.10 Attachment and sense of interdependence	20	+
3.11 Social embeddedness	4	+
3.12 Behavioural involvement	2	+
3.13 Content and meaning	6	+
4. Innovation effectiveness		
4.1 Effective/efficient innovation capacity	12	+
4.2 Future/expected innovation potential	20	+

As for stakeholder integration, the main challenges were attributed to stakeholders' interactions where miscommunication between stakeholders occurred. Unfortunately, some stakeholders were perceived as being disqualified from sharing their opinions and this caused tension between them. The difficulties were compounded by the slow response and high volume of routine work from the authorities' side and the negativity and disapprovals of some stakeholders. In relation to the team, the design team faced some challenges where language and cultural barriers were present among them due to the multiplicity of nationalities and work ethics. Also, they faced some problems when they dealt with members that did not share the same level of interest in the project. These challenges however were comparatively minor and were contained without causing major barriers that could have affected the success of the project and this was reflected in their overall positive views about the effectiveness of the innovation. According to them, the innovation is very successful in terms of effectiveness and efficiency of the innovation capacity, and its future expected innovation potential.

6.4 Case 2 Interpretation and results

6.4.1 Case2 (The AKO project) overview

AKO is a large-scale mixed-use residential development that aims to build the community in an architectural design that harmonizes nature with buildings to provide an attractive and sustainable environment, in addition to using energy efficient materials, air conditioning, lighting and controls along with low-emission paints and solar water heating systems. This research studied the relationship between the leader BM, the integration of internal and external stakeholders, and the innovation team to determine their influence among each other and the influence on the identity of the innovation team and, finally, to conclude if there is an influence on the effectiveness of the innovation.

6.4.2 Participants profile

A summary of the participants of the interviews is illustrated in Table below.

Table 6-28: Participants of the interviews in the AKO case

Interviewee number	Type of stakeholder	Position
#17	Leader (Client)	EVP
#18	Design team	SVP technical
#19	Design team	Lead architect
#20	Design team	Senior manager technical
#21	Design team	Senior manager MEP
#22	Consultant	Senior manager - design
#23	Consultant	Manager of sustainable development
#24	Consultant	Engineer of environmental sustainability
#25	Design team	Architect
#26	Consultant	Project manager
#27	Contractor	Project manager
#28	Leader (Client)	Manager on site
#29	Contractor	Project manager- contracting
#30	Supplier	Manager

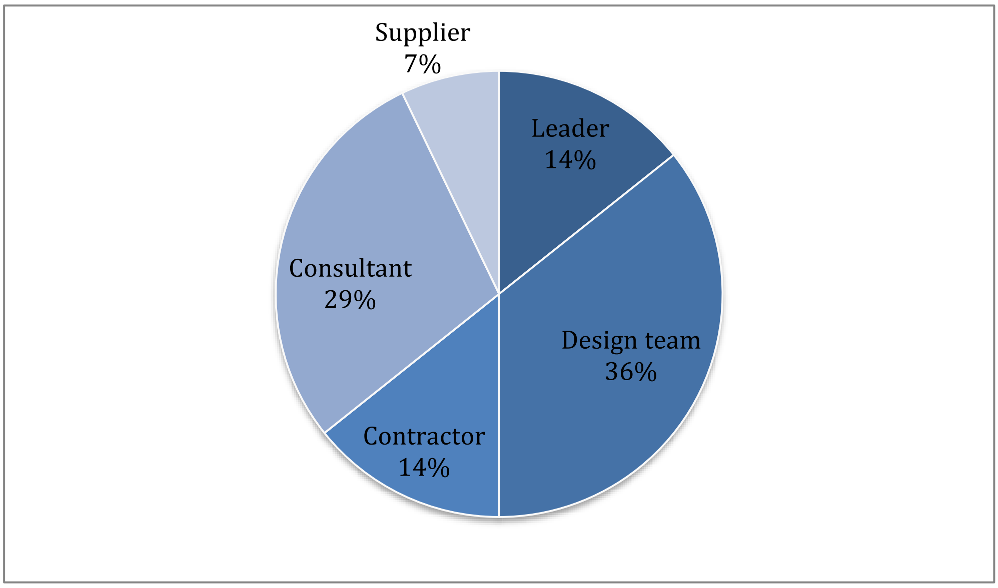


Figure 6-14: The interview participants-AKO case

6.4.3 Case study context

The following chart represents the number of coding references for each open innovation dimension. It reveals that the AKO case had used some means of open innovation such as employee involvement, customer involvement, inward IP licensing and external participation, and outsourcing R&D and external networking. Nonetheless, some aspects were mentioned more frequently than others such as outsourcing R&D and external networking (8 codes). The other aspects had almost similar number of coding references. The number of coding references for these dimensions was rather low in comparison to the SC case, which indicates less utilization of open sources of innovation. Yet, data supports that the innovation was open relying chiefly on outsourcing R&D and external networking.

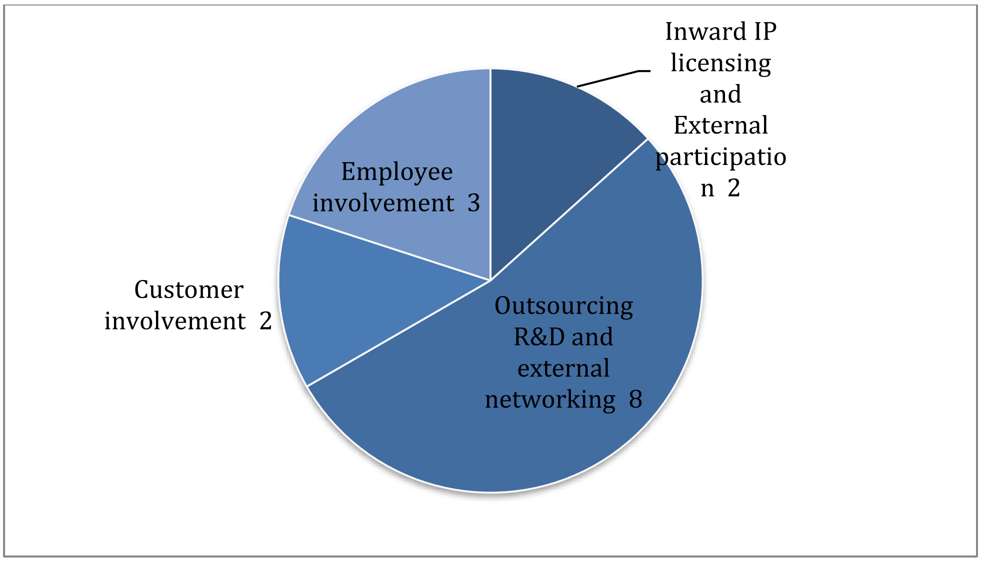


Figure 6-15: Number of coding references open innovation dimensions-AKO case

6.4.4 Interview interpretation and results

The steps to conduct the analysis and the interpretation of data for the AKO case is a repetition of the methods used in the SC case, therefore, this section does not describe these same methods and directly presents the results.

6.4.4.1 Category 1: Leadership for innovation (LI)

To revise and approve the dimensions of leadership for innovation in the AKO case, the following chart illustrates the number of coding references in each dimension.

The interviewees mentioned all dimensions in their conversation about leadership for innovation. An acceptable number of coding references for each dimension was noted which indicated that trustworthiness of the dimensions and the research questions that are related to each one and a decision to keep all of the dimensions was made by the researcher.

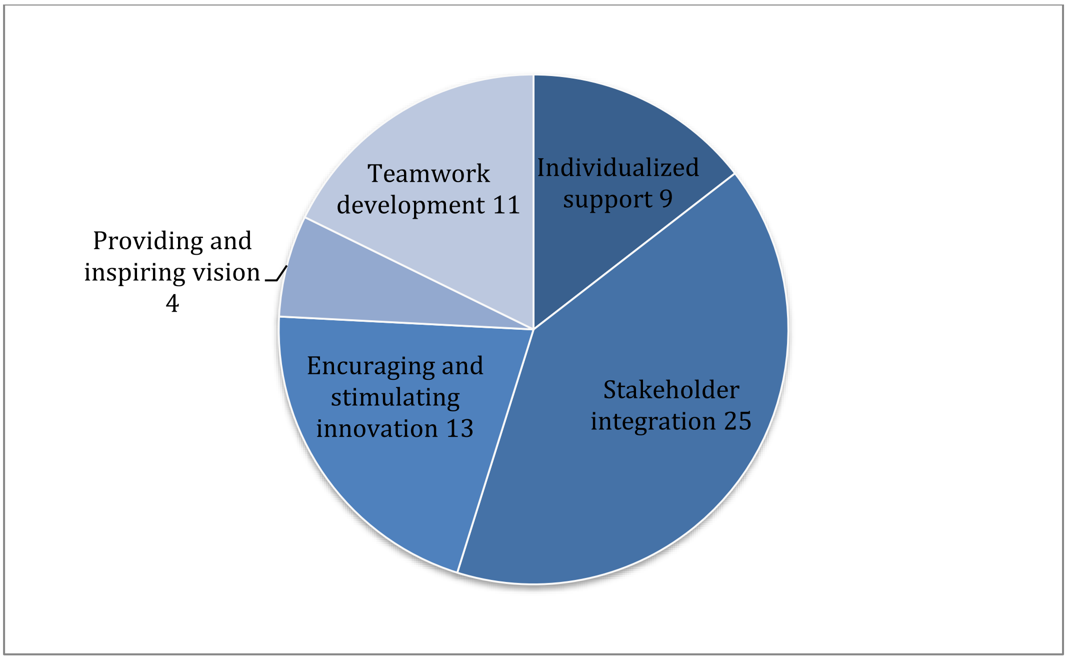


Figure 6-16: Number of coding references of LI dimensions-AKO case

The contribution of 12 out of 14 interviewees produced 62 related passages within the category leadership for innovation. This category consists of 5 dimensions as illustrated in the category model. The dimensions profile in Table 6-28 further elaborates the differences in responses for the dimensions in terms of the five types of stakeholders.

Table 6-29: Dimension profile- LI -AKO case

	Consultants	Contractors	Leaders	Design team	Suppliers	Total
1.1 Encouraging and stimulating innovation	3	0	9	1	0	**13**
1.2 Providing and inspiring vision	0	1	3	0	0	**4**
1.3 Individualized support	0	1	2	6	0	**9**
1.4 Teamwork development	2	1	5	3	0	**11**
1.5 Stakeholder integration	2	0	18	5	0	**25**
Total	**7**	**3**	**37**	**15**	**0**	**62**

1.1 Encouraging and stimulating innovation

It is clear from the table above that the leader, BM, pays attention to the 'encouraging and stimulating innovation' dimension of leadership. He encourages others to develop their own ideas through being an example, he said:

> [i]f my team sees that the leader is thinking about the project and how to get it different and build it in a very unique way, in a period of time, the whole team would adopt the same approach.

The dimension was less frequently mentioned by the consultants and the design team, and was not mentioned at all by the contractors and the supplier. A design team member (#21) reflected on this dimension through describing the leader as an encouraging person that urges others to develop their own ideas. He said, 'Every time they're meeting, the EVP says 'you are owning these villas for the time being. Are you accepting this in your villa?' It's a simple question.' The consultant (#22) described the leader as a person who looks constantly for opportunities to improve the project and boost innovation. He said, "I strongly believe that the leader has a huge role to play in how sustainable or not the development is."

1.2 Providing and inspiring vision

This dimension was the least frequently mentioned dimension (4 codes). The different stakeholders did not comment about it. The leader, BM, mentioned it predominantly (3 codes). The contractor mentioned it only 1 time.

BM thought that it is very important to provide and inspire vision and make it clear at the same time. He said, "project managers can make projects better only by knowledge, knowledge of new techniques, tools, technologies, solutions, materials, and so on. There we can make a lot of projects better." He added, "People have to read the message you have. By the end of the project, they have to say, we did that project and it was great." The contractor mentioned, "He will give you the vision as the leader of the project because we are in direct contact with him and the owners."

1.3 Individualized support

Some stakeholders mentioned aspects related to individualized support. The design team noted it predominantly while the consultants and the supplier did not mention anything related to it. Some interviewees pointed out that their leader is accessible and can manage problems, for example #28 said, "without management I get stuck with many things; through the weekly meetings and weekly reports I can perform the work. I need the guidelines from the leader; his opinions matter a lot." The contractor (#29) agreed that it is important to receive guidelines from the leader, he said, "he has to guide how we are moving."

The leaders realized the importance of spending time teaching and coaching the team members, #1 mentioned, "[m]y partner and I were leading them to guide and tune what they do." In addition to that, they recognized the potential and contribution of individuals , #11 said, "that was probably the second step that the management did, identify what people liked to do, and which people are good at doing certain things, and then divided up the work accordingly."

The design team thought that motivational behaviour and actions by the leader play and important role in encouraging innovation, #25 said, "[t]here is a kind of motivation, the leader gives both work and trust. He pushes everybody to do their best, to achieve the requirements to achieve the goals within limited time." Another point that the design team raised is that he understands job problems and the needs of individuals, the senior manager of MEP said, “[h]e knows what is going on so he's able to judge whether this problem might affect or not.” He added, “there are many mistakes in the project, our EVP covers the mistakes and help us resolve them.”

1.4 Teamwork development

The different stakeholders mentioned teamwork development frequently producing 15 codes. The leader encourages using IT to share information and resources to foster the climate of trust and collaboration. He also encourages members to think and share information to foster the climate of trust and collaboration, he said “[w]hat I love my team to do is to make them think about what they are working on and I encourage them to be a bit more integrative in the way we think, and the way we look at things.”

The design team and the contractor pointed out that the leader encourages the team and the different stakeholders to work together and share information and resources, the SVP technical said, “several department has to work together. It's not only the leader or one guy, it's several.”

1.5 Stakeholder integration

Stakeholder integration is the most frequently mentioned dimension within the category leadership for innovation. Leaders mentioned it predominantly; design team and consultants gave some few remarks about it. Contractors and suppliers made no remarks.

The leader showed awareness of the different type of stakeholders and their influence and thought that it is very important to know stakeholders and their needs and demands. He also thought that promoting communication with stakeholders is vital when he said, "bringing all stakeholders together to achieve a project objective is definitely the ultimate goal of every single project manager and every single project, actually." Further, the leader pointed out the significance of communicating and educating stakeholders. He mentioned:

> [e]ducation, you have to educate the investor. You have to make him aware about what is the importance of that system, why it's going to make this project different, how it's going to help this development for the next 15, 20 years.

The consultant agreed with the leader on the effectiveness of integrating stakeholders, she said:

> [b]ecause we had a very fast-track schedule, rather than us doing some work and then submitting it and for them to review it, we try work collaboratively so that we could get their feedback as the design progressed. And then at the end we have something that we knew they were already happy with.

After this coding process, the codes were categorized into positive, negative and neutral remarks based on the coding agenda represented in Table 6-30.

Table 6-30: Stakeholders' remarks about LI- AKOcase

Type of stakeholder	Negative leadership for innovation remarks	Positive leadership for innovation remarks	Neutral leadership for innovation remarks
Consultants	0	2	2
Contractors	0	2	0
Leaders	3	6	5
Design team	0	10	3
Suppliers	0	0	0
Total	3	20	10

The table shows that stakeholders varied in giving positive, negative and neutral remarks about leadership for innovation in the AKO case. The design team had the most positive remarks (10 codes) followed by the leaders, the contractor and the consultant. The supplier did not make any obvious remarks about leadership for innovation. Two remarks from the consultants were neutral and three from the design team while 5 were from the leader. There were 3 negative remarks expressed about leadership for innovation by the leader himself.

The following table represents examples of significant positive, negative and neutral statements by the different types of stakeholders. The related dimension's number followed each statement.

Table 6-31: significant statements about LI- AKO case

Positive significant statements about leadership for innovation	
Consultants	- But workshops and making things voluntary, making things incentivised, I think that would go a long way in getting people more interested in this, which is why I keep saying people were to be bused out, that's something which AKO leadership does (1.1) - I think our leaders are also going to go a long way in creating passive responses for sustainability (1.1)
Contractors	- He will give you the vision as the manager of the project because we are in direct contact with him and he is in direct contact with the EVP and the owners (1.2) - My opinion about him is that he is very good. He is put in that position, you have to report to him properly. And he has to guide how we are moving (1.3)
Leaders	- We created a kind of virtual hub and that virtual hub gathers all the information in the project. And we established different accesses to that hub (1.5) - We're trying to develop, with some of our consultants, a new technique in using the ground water, and we are trying to introduce an absolute brand, a new technology (1.1, 1.5) - The way I look at it, if I'm going to cut the CO2 by cutting your requirements to pay visits to certain locations, and just by having all the access in your house, that's also a sustainability isn't it? It is (1.2) - What I love my team to do is to make them think about what they are working on, once the project is completed, it's going to have a vast impact on the city. It's going to have an impact in terms of traffic, in terms of population, in terms of emissions, in terms of waste. So I encourage them to be a bit more integrative in the way we think, and the way we look at things (1.4)
Design team	- Every single project, it's a teamwork (1.4) - Several department has to work together. It's not only one guy, it's several (1.4) - Our EVP, he is technically more than sound. He's good. I don't want to talk because I know him, but it is the truth. He knows what is going on so he's able to judge whether this problem might affect or not (1.3) - There are many mistakes in the project, our EVP covers the mistakes and help us resolve them (1.3) - Every time they're meeting, even the EVP says this "You are owning this villas for the time being. Are you accepting this in your villa? It's a simple question. (1.1)
Neutral significant statements about leadership for innovation	
Consultants	- If you give incentives to anything, it becomes a lot easier (1.1) - I strongly believe that a master developer has a huge role to play in how sustainable or not the development is (1.2)
Leaders	- Bringing all stakeholders together to achieve a project objective is definitely the ultimate goal of every single project manager and every single project, actually (1.5) - Sharing of information because it's very important, keeping those stakeholders informed. It's an essential element of communication in project management (1.5) - So project managers can make projects better only by knowledge, knowledge and only knowledge, knowledge of new techniques, tools, technologies, solutions, materials, and so

	on. There we can make a lot of projects better (1.2) - In any successful organisation, there should be a spiritual leader (1.4)
Design team	- There are some positive and negative points in my management, we have people that come from very different markets and culture, Dubai is a very active markets, any building is related to many authorities, so the managers should know how to deal with different authorities to lead this ship well (1.5) - When I see the executive level and know that their hard work led them to their positions, I feel motivated to work harder to achieve that too (1.2)
Negative significant statements about leadership for innovation	
Leaders	- Perhaps, the immaturity of the project management here plays a role. Perhaps, the dynamic market that we have in UAE also plays a role. And the States people consume more time to get the project done. They don't do it as quick as we do it here, in Dubai, for example (1.5) - We used to have much more bigger potential in the States in terms of project management which you can't use here for many reasons (1.5) - The community social responsibility in this part of the world is very weak. You don't have it (1.5)

The table shows that the positive remarks covered all leadership for innovation dimensions, while the negative remarks where about the immaturity of project management practices in the country according to BM, which leads to poor teamwork development and a delayed project.

Many interviewees were neutral in discussing leadership in the project, they were mainly concerned to point out some practices that any leader should do rather than commenting on their leader’s qualities. The main aspects that they highlighted neutrally were:

- Giving incentives.
- Sharing information and communicating with the different stakeholders.
- The knowledge of how to deal with stakeholders.
- Leaders being role models to their employees.

6.4.4.2 Category 2: Stakeholder integration (SI)

To revise and approve the dimensions of the category, the following chart illustrates the number of coding references in each dimension.

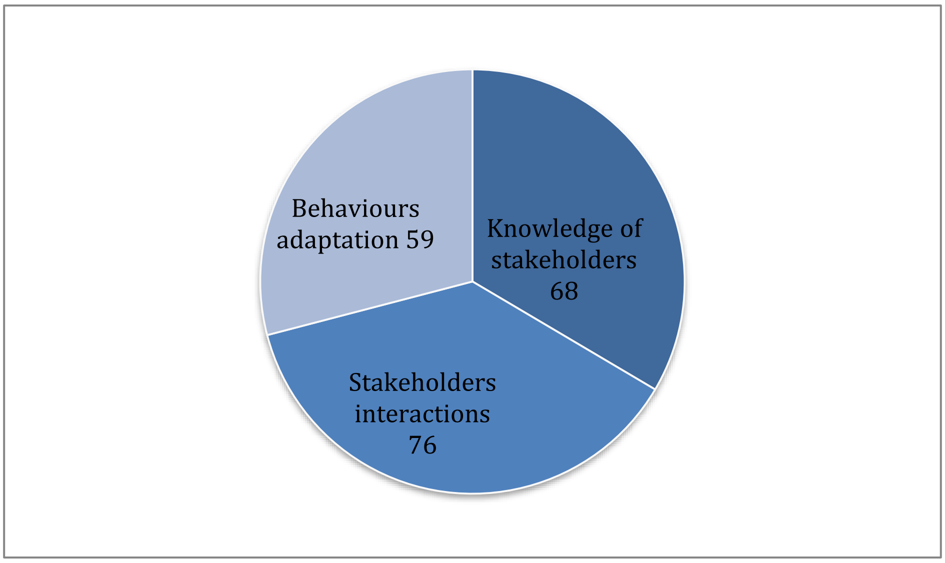


Figure 6-17: Number of coding references of SI dimensions-AKO case

An adequate number of coding references for each dimension was attained in this category, which indicated that trustworthiness of the dimensions and the research questions that are related to each one.

The conversation with the different interviewees about stakeholder integration produced 203 related passages, with the involvement of 14 out of 14 interviewees. This category was divided into three dimensions. The following dimensions profile illustrates the number of responses of the five stakeholders about each dimension.

Table 6-32: Dimension profile, category 2, SI- AKO case

	Consultants	Contractors	Leaders	Design team	Suppliers	Total
2.1 Knowledge of stakeholders	13	0	15	39	1	**68**
2.2 Stakeholders interactions	16	15	11	32	2	**76**
2.3 Behaviours adaptation	14	4	15	26	0	**59**
Total	**43**	**19**	**41**	**97**	**3**	**203**

2.1 Knowledge of stakeholders

The table above shows that the design team mentioned knowledge of stakeholders predominantly, followed by the leaders and consultants. The supplier provided one remark about it while the contractor did not mention anything related to this dimension. The leader was very aware of the different stakeholders and their influence on the project, he said, "the local authorities are one of the major stakeholders, the other ones are more or less typical standard stakeholders and they are less or more manageable." In addition to that, he pointed out the importance of devoting time and budget to know stakeholders characteristics (performance, relationships, positions of power, importance, etc.) he mentioned,

> [y]ou have to determine the amount of influence of every single stakeholder. Once you define that, you would define the priority of that stakeholder, and you will define the level of involvements of that stakeholder because some of the stakeholders, you have to keep them involved. Some of them, as you know, have to be just informed. Some of them has to participate in making decisions and so on. So once you define the objectives, you define the priorities, and you define the importance and the involvement, and then you define the function.

The design team articulated many opinions about this dimension; they thought that the knowledge of stakeholders' demands, rules and regulations is very important especially at the design stage, the SVP technical reflected that it is important that the design team and the consultants understand each other well to get the work done faster. In their case, the design team knew that the consultant works well under pressure and the consultant knows that the client's design team requires fast responses from their side; therefore, they were working accordingly. The SVP said, "the more pressure that we put on them, the more turn around, the faster that we come back with comments, and then the consultant anticipates that. He knows that when he submits something he can't sleep for a week."

Consultants are also aware of the importance of knowing the rules and regulations that the different stakeholders have, especially the ones that are associated with sustainability measures, the sustainability manager mentioned, “[s]ince we have knowledge of the Estidama requirements - EHS, LEED - we have been doing many from the last few years so we are aware of the DM requirements so we just support them.” Although the supplier did not give any remarks about leadership for innovation, he mentioned that the previous experience they had with the developer is critical, he said, “we worked with them before in many projects, we know how to deal with them, its a motivation.”

2.2 Stakeholder interactions

Stakeholder interactions was the dominant dimension mentioned by the different stakeholders (95 codes). The design team frequently mentioned it in the interviews.

The SVP technical (#18) stressed on the significance of the early interactions with the authorities and repeatedly mentioned aspects related to it, for example he said, “[i] think it's important to get engaged with the authorities in a very initial stage. That will help you to plan your project well.” The consultant agreed with that and said:

> [i] think it's always good to get the contractors involved as early as possible. I think it's always better to have that conflict early because otherwise you're just having it later. And then everyone's already stuck in their way. So, they don't want to go back and change things.

The design team reflected on choosing appropriate strategies to deal with stakeholders, for example, when they dealt with the consultants they had to challenge them to achieve a good outcome from of their work, a design manager (#18) said, ‘so our role is to challenge the consultant, to tell them, "No, it can be done in a different way, don't do this, do that."'

Having intensive and frequent communication with and among stakeholders is another aspect that was mentioned by a number of interviewees, a contractor (#29) stated, "communication has major impact in the construction industry. Miscommunication causes all of the problems, even at small-scale projects. It affects cost and time." He explained that understanding each other while communicating is vital, "the way you transfer the message and communicate your message to others is important. They have to understand what you are trying to tell them, you have to pay attention to that." He reinforced the importance of diffusing information correctly; "sometimes the correct information flow does not reach the right person at the right time. So time and cost problems happen."

The supplier (#30) and the MEP manager (#21) thought that a good coordination between the different stakeholders is vital to achieve the projects goal. The supplier said, "there was a good coordination between us and them" while the MEP manager said, "everybody should work with him shoulder to shoulder."

2.3 Behaviours adaptation

The different interviewees discussed behaviours adaptation repeatedly. The leader emphasized that the projects policies and priorities are adapted to stakeholders' demands, he said, '[y]ou cannot standardize an approach. You cannot say, "this is the approach to all stakeholders, and I'm going to use this widely across all the project.s' This will never happen."'

The SVP technical (#18) identified some techniques that they used to adapt to stakeholders' behaviour. For example, they designed the whole project then they only build some clusters, and then based on the customers' reactions to the clusters, they move on with the others. He said:

> [w]e create the entire master plan as a vision, and then we start selling certain clusters and we launch certain clusters, and then we get an idea of how the market reacts to it. And depending on that reaction, might give us directives of how to re-investigate different clusters. Maybe we design them with a certain intention, and then sales drive us to sort of change that.

Other design team members have also mentioned how they changed some of their objectives in line with stakeholders' demands. The lead architect (#19) said, "it is not straight forward. Sometimes, yes we have to get them what they want." While at other times they had to understand the behaviour of the stakeholder and try different ways to get what they want from them. The MEP manager (#21) mentioned the different ways they tried to help the contractor meet the deadlines, "by motivating the contractor, sometimes we're paying in advance. Sometimes by helping them buying materials directly from the market, which we did. Sometimes bring labor for them, sometimes injecting new sub-contractors."

The contractors found it difficult to adapt to stakeholders' behaviours, they kept mentioning how changing the scope of the project affects their work and causes major delays. They thought that it was very difficult to contain the issue with a very tight schedule, a project manager from the contracting company (#27) said, "they keep changing the scope, this is our major concern. When the scope at the early stages is not very well defined, it will absolutely affect time and cost. It causes major delays."

The consultants in the meantime worked hard to prepare information and teach the contractors about the fauna and flora of the construction site because contractors where unconscious about the significance of this issue. The consultant project manager said:

> …so one of the initiatives was to have toolbox talks, where they have a meeting in the morning and explain to them (contractors) what they should do if they see native floor and fauna - how they should behave and respect the environment and to give them training.

After this analysis process, the table below is the result of the coding and categorizing of text into positive, negative and neutral interviewees' remarks about stakeholder integration in the AKO case.

Table 6-33: Stakeholders' remarks about SI-AKO case

Type of stakeholder	Negative stakeholder integration remarks	Positive stakeholder integration remarks	Neutral stakeholder integration remarks
Consultants	4	14	13
Contractors	8	2	6
Leaders	1	16	15
Design team	7	43	17
Suppliers	0	3	0
Total	20	78	51

As shown in the table above, there were different remarks made about stakeholder integration in the AKO case. Positive remarks were the most frequent ones (78 codes) followed by neutral (51) and negative remarks (20). The following table represents examples of significant positive, negative and neutral statements by the different types of stakeholders. The number of the related dimension follows each code.

Table 6-34: Significant statements about SI-AKO case

Positive significant statements about stakeholder integration	
Consultants	- Since we have knowledge of the requirements, we have been doing many from the last few years so we are aware of the DM requirements so we just support them, and whatever clarity they require, we just support them in that (2.1) - People don't know enough, and therefore they keep resisting. It's almost like a vicious cycle. Once you start getting them familiar with it, then everybody begins to embrace it (2.1, 2.2) - Fortunately, I had the opportunity to work with most of the contractors from the beginning. We have got the opportunity from the beginning to work with them, to introduce what is the concept and what could be the challenges, so you need to be prepared well in advance Every week, we are able to discuss with them because we understand, when we tell a requirement, they are going to go back and discuss with the supplier (2.2). - Things that we pick up onsite like the contractors have very messy areas. They're not ponding their equipment. So we give them mitigation measures to put in place - actions they can take (2.3) - So one of the initiatives was to have toolbox talks, where they have a meeting in the morning and explain to them what they should do if they see native floor and fauna - how they should behave and respect the environment and to give them training. So that was one thing we pushed was to have toolbox talks and also to have an induction when new people come onsite and to run training programs (2.2). - The thing that makes a big difference with the authorities is building relationships with the people there (2.1)
Contractors	- So the key stakeholders, we directly communicate with them according to the specifications of the project in the contract (2.2). - On daily basis we are doing the coordination between the different parties involved on site (2.2)
Leaders	- The objective of any developer or investor is to make money, let's be honest. That's fair. Any solution that I want to come up with has to not contradict with his objective to make money. Otherwise, it would not materialize. So the first what I do, I make sure that this idea is going to make financially sound solution to the owner (2.1, 2.3) - Education, you have to educate the investor (2.2) - The idea started like we see the trend, we see that the government are moving very surely and aggressively to a more sustainable city, a more smart city. So let's be part of that (2.1, 2.3) - We call them for meetings, we discuss strategies, we have programs from them, program starts from signing agreements, make sure the materials have been submitted and approved, orders have been placed, proof of orders have to be submitted, confirmation from the subcontractor and the supplier about the delivery date is very important (2.2) - If the aluminum subcontractor has to finish 3 villas per day to achieve the completion date, currently he finishes 1 villa per day. Means 100% is not going to achieve. How do we overcome this, we have to improve the productivity, reward labors, any kind of encouragement. This will improve 20% but will not solve the problem (2.3)
Design team	- We do the entire master plan as a vision, and then we start selling certain clusters and we launch certain clusters, and then we get an idea of how the market reacts to it. And depending on that reaction, might give us directives of how to re-investigate different clusters. Maybe we design them with a certain intention, and then sales has driven us to sort of change that (2.3) - We were sitting in the authority's office asking 'What do you want?' If they say that they want something to be modified, we modify and we go back to them directly. We put it there and ask if they want anything else and we immediately act upon that (2.3) - For AKO we were 'sleeping in the office.' We were the first company to come, sitting with them and the last one to go outside. So we were there. We managed to get the approvals in three months instead of nine months (2.1, 2.3) - So our role is to challenge the consultants and guide them to reach to a certain level (2.2) - Sometimes we make changes in the plan for the sake of everybody's interest. Then we have to inform the contractor we've made this change and the first thing that the contractor does is complaining, "Oh, it's going to create this problem and that." And we have to tell him and convince him that we've done our internal analysis, and we believe that the impact is not as extensive as he's making it out to seem (2.2). - If we communicate it to the contractor early when we are analyzing that change, the contractor will be alarmed. If he's alarmed, he might slow down some processes. And then after we do our analysis, if it proves that it's not feasible, then we've actually hindered the contractor (2.2) - If we inform the contractor of any change, there are two reactions. Either he will slow down

	because he will see the changes coming, and in case that change does not happen or implemented, then that's when you are delaying the project. The second reaction is that he will construct fast. So, by the time you have decided, he says I have finished this one so you will have to demolish again, or it's big variation problem (2.1, 2.2) - I worked as a contractor for 20 years. In order to achieve his financial or profits required, he will try to plan the cheapest material, or not the standard (2.1) - Motivating the contractor, sometimes we're paying in advance. We need to live with that. Sometimes by helping them buying materials directly from the market, which we did. Sometimes bring labor for them, sometimes injecting new sub-contractors (2.3)
Suppliers	- Not really, we only respond to their requirements. We show them the different options that we have with their prices, discuss the good and bad about each product then they make the choice. Its up to them, it depends on their budget (2.2) - We worked with them before in many projects, we know how to deal with them, its a motivation (2.1) - There was a good coordination between us and them (2.2)
Negative significant statements about stakeholder integration	
Consultants	- Ignorance is one of the biggest challenges that we have (2.3) - During construction, I think the biggest challenge is when you ask the contractor to provide you with a green building compliant product, they basically are trying to oil the system and get you any kind of lab test result (2.2) - We had a survey that was done, and that's what we based our whole design on. And then when the contractor came aboard and did their survey - their original ground survey - they found it was different to what we designed based on. So that meant we had to go back and redesign (2.2) - I think the other things are just challenges that you have on most projects - different consultants working on them, and there's a different consultant for the golf course. So, you need to work collaboratively, but they weren't onboard when we first started. So, we did some designs based on maybe an older version of the golf course that then had to be updated (2.2).
Contractors	- The problem with most of the contractors, including us, is that you start. Then want to deliver. Changes will come; we will not go through the details of the changes. That's why you start saying, I don't have time, you are always changing although you signed a contract and in the contract there's procedures for changes. Most of the contractors don't want to follow. Some contractors will be happy because they know exactly how to follow that, the contractual terms to the contract. And they will get their rights sometimes, if they know, they will get it. But most of the time a contractor will miss the dates, there is a date and duration for every notification, he will miss the dates. That's why the struggle will come (2.3) - Interpretations. When we write formal emails or letters, sometimes people interpret in different ways. For the same aspect we have different opinions (2.2) - For example, an engineer heard that the consultant wants to do some modifications to the designs but they did not really communicate with us. When we inquired, they said don’t worry it will be at the latest stage of the project. But we cannot move forward because it can cause some problems later, but they are not telling us about the modifications. These sorts of classic tensions between contractors and consultants or clients are the main cause of challenges. They don’t give direct information, this is very common in this culture, you might not find this in other cultures (2.2) - Also usually there is no trust between the consultant and the contractors (2.1, 2.2) - When we sign the contract with the developers, we work accordingly. But they keep changing the scope, this is our major concern. When the scope at the early stages is not very well defined, because the contract is lump-sum, when the scope changes it will absolutely affect time and cost. It causes major delays (2.3)
Leaders	- Because every subcontractor has its own way of work and strategy. The contractor is suffering with his subcontractors for the civil activities, sometimes he has like 32 subcontractors working on plaster for example. Every subcontractor has his own quality and productivity and his own way of execution. Because of that some villas will have excellent plaster, some average, some bad. We don’t have another option, we just make them subject to the quality that we need (2.2)
Design team	- The staff number in DM are not so much, and maybe they have a lot of other projects to look at, so they don't dedicate full time to you. We try as much as possible to work with that, but that's authorities. What can you say? You have to accept that (2.2, 2.3) - They're not responsive (2.2) - All contractors, and I don't want to admit will exaggerate things to their benefit (2.3) - To reach the sustainability, you should have two figures. We are not doing it here in UAE, because no one will accept having recyclable material. Therefore, I told you the culture is a little bit different (2.3)

	- But authorities are challenging to be honest. Some very powerful authorities, they have regulations and their regulations are clear, but when they audit, they have comments with no reference. Ok, there are comments but its not written here, everything should be documented with references. So if we have a reference, we can move smoothly, but if its not written then we cannot expect it (2.2) - In Dubai, the procedure is that you can submit initial and final, but there is a huge different between the two. DM have like trends, now recently, they focus on natural light and ventilation. How can I know when you request something new, sometimes I change some of their requirements at a late stage with causes problems (2.2)
Neutral significant statements about stakeholder integration	
Consultants	- During the building permit, the contractor just ensures that all the design parameters are implemented as per DM, which are further actually assessed by DM, and finally they give the BP with the green logo (2.1) - Our role right now is that we're ensuring that the contractors are following it because this DM regulation is a very new regulation (2.2) - I think it's always good to get the contractors involved as early as possible. I know it's not always easy because there's contractor relationships and the standard method of doing it as we design, then we tend to apoint a contractor. Then they come onboard. But some of the new relationships like design-builds where the contractor hires the designer, and we work together - sometimes that can give a better product because you can incorporate all the constructability issues at the design stage (2.2)
Contractors	- Communication has major impact in the construction industry. Miscommunication causes all of the problems, even at small-scale projects. It affects cost and time (2.2) - The information, mainly the way how each person gets the information. How we understand that information (2.2)
Leaders	- Authorities, they do have lots of changes in terms of regulations, laws they introduce every now and then, something new, and then you have to be with that and redesign accordingly (2.3) - Bringing all stakeholders together to achieve a project objective is definitely the ultimate goal of every single project manager and every single project, actually (2.2) - The more you educate the project managers about certain materials that will tell you would bring value to the people who will reside there (2.2)
Design team	- To do that, several departments have to work together. So you have the architectural, structural, electrical, mechanical, infrastructure, and in our project we have golf. All those could be in-house, or could be served from outside, outsourcing (2.2) - I think it's important to get engaged with the authorities in a very initial stage (2.2) - Contractors, they are very busy. Either they are very busy or either they have-- after the recession, some contractors they have shrink to small companies, so that they don't have that much resources (2.1)

Positive remarks were given for all of the stakeholder integration dimensions; the negative remarks were given primarily addressing aspects related to stakeholder’s interactions (2.2) and behavioural adaptation (2.3). The negative points can be summarized as follows:

- The miscommunication between the different stakeholders.
- The ignorance of some stakeholders in regards to the innovation.
- The late integration of some stakeholders.
- The slow responses and routine work from some stakeholders.
- The change of scope, requirements, and designs without early notice.
- The inability to adapt to some stakeholders’ behaviours.

6.4.4.3 Category 3: Team identity (TI)

To revise and approve the dimensions of the category, the following chart illustrates the number of coding references in each dimension.

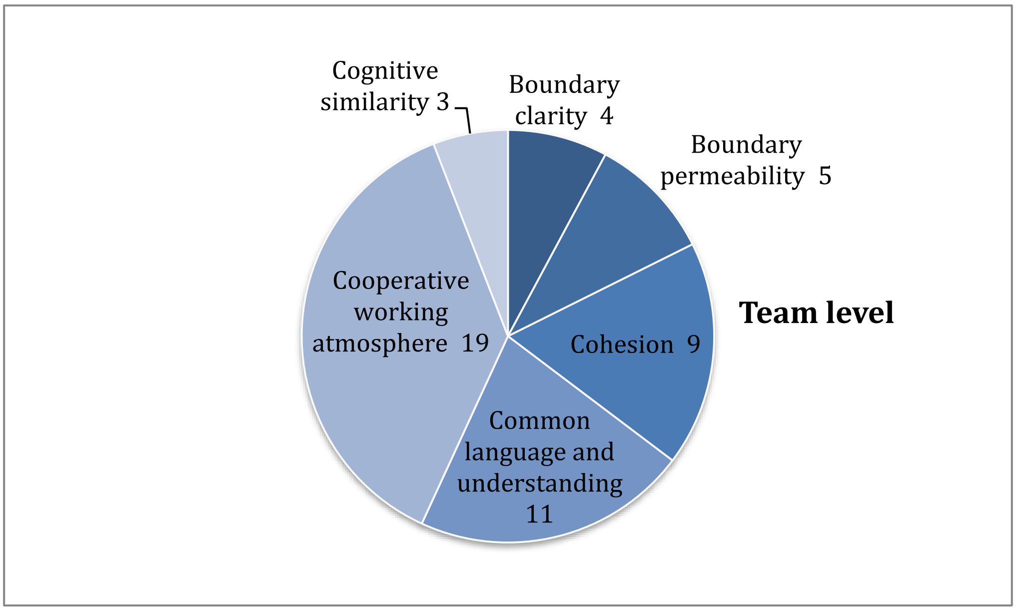


Figure 6-18: Number of coding references of team level TI dimensions-AKO case

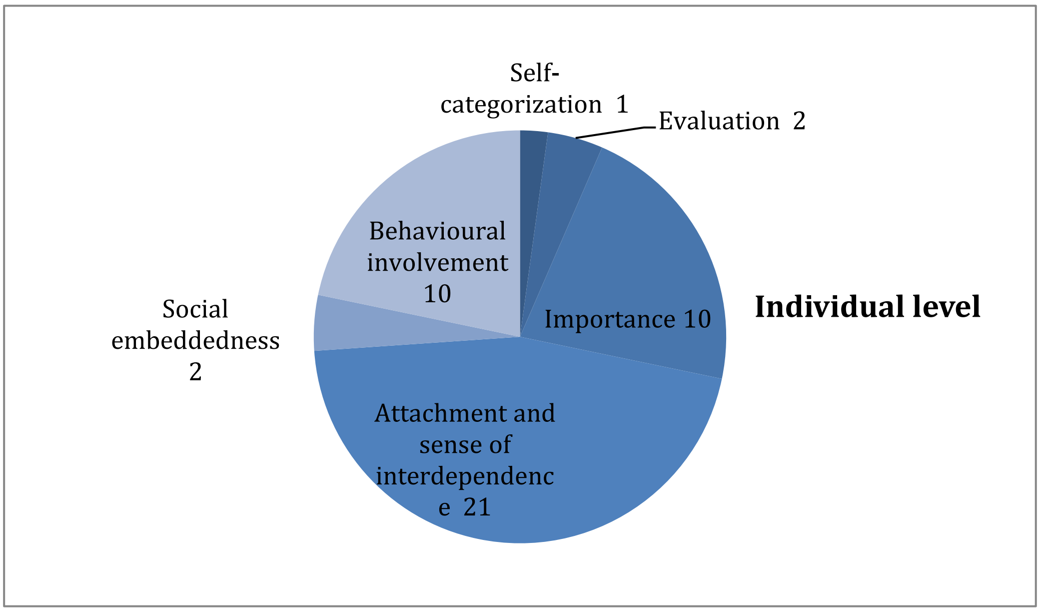


Figure 6-19: Number of coding references of individual level TI dimensions-AKO case

The different interviewees mentioned both the dimensions of team identity at a team level and an individual level. Nevertheless, some dimensions were mentioned scarcely such as evaluation, social embeddedness, self-categorization, content and meaning and boundary clarity. The researcher decided to keep the other dimensions at this stage and decide whether to retain the dimensions that are mentioned less than 5 times at the end of the analysis of the different cases. The rest of the reference numbers indicates the reliability of the dimensions and the research questions that are related to them.

The interviews produced 97 team identity related passages. This category was decomposed into 6 dimensions at the team level and 6 dimensions at the individual level. The dimension (content and meaning) was excluded because there were no codes associated with it. The dimensions profile in Table 6-35 further elaborates the differences in responses amongst the dimensions in terms of the five types of stakeholders.

Table 6-35: Dimension profile- TI- AKO case

	Consultants	Contractors	Leaders	Design team	Suppliers	**Total**
Team level:						
3.1 Boundary clarity	0	1	1	2	0	**4**
3.2 Boundary permeability	1	0	3	1	0	**5**
3.3 Cohesion	1	1	2	5	0	**9**
3.4 Common language and understanding	1	3	3	4	0	**11**
3.5 Cooperative working atmosphere	5	2	5	7	0	**19**
3.6 Cognitive similarity	1	0	2	0	0	**3**
Individual level:						
3.7 Self-categorization	0	0	0	1	0	**1**
3.8 Evaluation	0	2	0	0	0	**2**
3.9 Importance	3	2	2	2	1	**10**
3.10 Attachment and sense of interdependence	7	2	8	4	0	**21**
3.11 Social embeddedness	1	0	1	0	0	**2**
3.12 Behavioural involvement	5	1	2	2	0	**10**
3.13 Content and meaning	0	0	0	0	0	**0**
Total	**25**	**14**	**29**	**28**	**1**	**97**

<u>Team level</u>

3.1 Boundary clarity

Boundary clarity was scarcely mentioned by the interviewees (4 codes). The leader (#17) reflected on this dimension through mentioning how each team member knows his roles and responsibilities in the team, which helps them to be clear about the team they belong to, he mentioned, “we will define your function in the project. Let's say, that you are a design manager, then we will define the privilege given to you, are you an internal or an external resource.” A design manager thought that it was useful to know where you belong and maintain consistency in that relationship, he said, “i don't want a member of the team to be moved from a project, to different project. Because if you only do an aspect of it, you don't feel like it is yours. So I try to maintain that whoever works on AKO is consistent.”

3.2 Boundary permeability

Boundary permeability was not mentioned frequently (5 codes). Mainly the leader talked about it. He thought that a good exchange between the team members and other teams was important; therefore, he stressed the importance of having an integrated system to share and store information. He said:

> …let's assume, tomorrow, you want to leave the company, someone else wants to replace you. All what you need to do is just given the access to that subfolder, and the there he goes and he sees the whole trace of communication from day one until the day you joined the company.

A design team member (#25) thought that sharing knowledge and experience from different people with different backgrounds and countries of origin was crucial for the project, he said, “[a]s a team, we help each other; we have different experiences from different countries and professions. Each one brings a totally different experience and different view and try to improve things here.”

3.3 Cohesion

The different interviewees mentioned this dimension producing 9 codes. It was obvious that there was a tie between some team members and the project. The leader (#17) said, "…there is something deep inside laughing and smiling. It's like I have made some change, I see what I have done and my kids can see what I have done. It's feeling proud."

A design team member felt proud that he is part of this group and said, "I was involved with this team and I'm proud to see that building come up." The MEP manager showed that there was integration in the team when he said, 'I'm saying "we" of course not me, the whole team.' The contractor thought that being part of this team is good because of the size and name of the project and the benefit he would have from working with them, "all of us are related to AKO. At the end you are working with a big development, it's always good to have it in your CV."

3.4 Common language and understanding

The different interviewees frequently mentioned this dimension producing 11 codes.

The leader had some difficulties regarding this aspect due to the difference between his background and culture (he moved from the U.S) and the culture of the project and the city as a whole. Therefore, he could not understand the way things work in Dubai very fast and he kept comparing it to the US, he said, "perhaps, the immaturity of the project management here plays a role. Perhaps, the dynamic market that we have in UAE also plays a role."

On the other hand, the design team thought that spending time together made them forms a commonality in the way they think and work. A design team member (#20) said, "…if they spent a long time on the project, they understand the challenges and the changes that we've made to the project, and they feel like they were are a part of those changes".

The contractors pointed out that conflicts arose due to misunderstandings. #27 said, "[i]nterpretations. When we write formal emails or letters, sometimes people interpret in different ways. For the same aspect we have different opinions."

3.5 Cooperative working atmosphere

This dimension was the most frequently mentioned one producing 19 codes. Many team members pointed out that they had a cooperative working atmosphere where they had frequent meetings to discuss and resolve issues. The SVP (#18) mentioned, "because we have developed the concept and we have a strong team, we have weekly, sometimes daily, meetings with the consultant to explain to them where we have made changes, where we think the project needs to go in a different direction." He added, "[y]ou have to get them involved in a project. And the most important thing is they should understand why you're asking them to make, this change."

The consultant (#26) agreed and mentioned that were working closely with the other team members, she said, "everyone's there together, and we all are under the same pressure. I think it's important that we all respect each other and each other's input into the design."

The contractor (#29) likewise expressed a similar viewpoint, he mentioned:

> [i]t's a teamwork at the end, as a project manager because you have the engineers and you have the plan and you have so many other partners involved. You need the feedback from all these parties in order to perform. So you have to work both as one of the team and sometimes as the team leader.

3.6 Cognitive similarity

The interviewees did not mention this dimension often. They only pointed out that they share the same objective, which is delivering the project with quality. The contractor (#29) said, “at the end we all want the same thing, which is to get the project built.”

Individual level

3.7 Self-categorization

There was only one remark about this dimension reflecting that once a member is 100% dedicated to a specific team, he feels that he is part of that group. A design team member said, “if you're only involved in 10% of any project, you never claim it as yours. If you're involved 100%, you feel like you're a valuable part of that team.”

3.8 Evaluation

The interviewees did not seem to evaluate their work, only 2 remarks by the same person reflected that their satisfaction comes from the success of the project. The contractor said, “I want the project I am working on to succeed with a reasonable quality. That would be my achievement.”

3.9 Importance

The different interviewees reflected on this aspect repeatedly. They thought that being part of this project is very important for their careers. The consultant said, “[i]t's quite an iconic project, so it's something that will look good on their CV. They know that they're working for something that's an exciting project.” The contractor (#29) agreed with this thought and said, “at the end you are working with a big development, it's always good to have it in your CV.” The supplier also mentioned, “It is good to have their name on our profiles.”

Another aspect is the feeling of satisfaction and pride that is associated with working on projects such as this one. The leader (#28) said, “its something that I feel proud of.” The contractor shared the same thought, he mentioned, “[w]e are building a city inside a city, it is nice to be part of this city. It is nice to be part of the city that will serve thousands for many generations.”

3.10 Attachment and sense of interdependence

This dimension is the most frequently mentioned dimension at an individual level producing 21 codes.

The interviewees reflected on this dimension through explaining their feelings about being part of the team and the project. The leader also demonstrated a sense of attachment in saying, “in my development - and I say mine because I feed it like its mine.”

Others, such as the consultant, reflected on this dimension through showing an effective commitment to the project, she said, “its not my responsibility but I am following up on what's onsite because I want to make sure the things that we have studied and reported on are actually getting put in place.”

Some interviewees also revealed a sense of common fate, for example #28 mentioned, “the success of this project is my success. I care that the project succeeds.”

3.11 Social embeddedness

The leader (#17) and the consultant (#26) reflected on this aspect by mentioning some everyday social connections with the team, for example the consultant said, “[w]e try to have team building exercises, like go out to lunch, or we celebrate people's birthdays, just to make them feel like they're a valued member of the team.”

3.12 Behavioural involvement

Different interviewees commented about their engagement in actions that directly implicate the collective identity of the team. A consultant (#22) mentioned, “at least two days in the week, Adrian and I make it a point not to use our cars. That's again something that we have acquired through this project.”

He also added, “people who have come from a consultant background within AKO definitely are inculcating some of this within their own lifestyle and encouraging it in others.”

After this coding process, the table below is the result of coding to categorize text into positive, negative and neutral interviewees’ remarks about team identity in the AKO case.

Table 6-36: Stakeholders’ remarks about TI -AKO case

Type of stakeholder	Negative team identity remarks	Positive team identity remarks	Neutral team identity remarks
Consultants	1	15	2
Contractors	0	5	4
Leaders	2	11	5
Design team	0	13	6
Suppliers	0	1	0
Total	3	45	17

From the table above, it is clear that there were different remarks about team identity in the AKO case but the positive remarks were predominant (46 remarks) followed by neutral (17) and negative remarks (3). The following table represents examples of significant positive, negative and neutral statements by the different types of stakeholders. The number of the related dimension follows each code.

Table 6-37: Significant remarks about TI, AKO case

Positive significant statements about team identity	
Consultants	- People like myself, Adrian, we are all bicycling enthusiasts so, at least two days in the week, both of us we make it a point not to use our cars. That's again something that we have acquired (3.12) - People who have come from a consultant background within AKO definitely are inculcating some of this within their own lifestyle and encouraging it in others (3.12) - As a team, we help each other; we have different experiences from different places, some come from management, some supervision, some consultancy and the best thing that we listen to each other. Some of us come from other countries like Hong Kong and Singapore and they bring their totally different experience and different views from these countries and try to improve things here (3.2) - So I think it's a very rewarding job (3.10) - I work very closely with our resident engineer onsite, and our environmental monitoring team who are going out onsite and trying to push the contractors (3.5) - And then we celebrate things that go well, like if we get something approved we make sure that we recognize people for doing that. We try to have team building exercises, like go out to lunch, or we celebrate people's birthdays things like that, just to make them feel like they're a valued member of the team (3.5, 3.11) - I think because projects like this one of their reasons is that it's quite an iconic project, so it's something that will look good on their CV (3.9) - Also I think because they do spend so much time and effort on a project like this that just intrinsically they feel attached to it (3.9) - Obviously there's tensions sometimes, but at the end we all want the same thing, which is to get the project built (3.6)
Contractors	- At the end you are working with a big development, it's always good to have it in your CV (3.3, 3.9) - We are building a city inside a city, it is nice to be part of this city. It is nice to be part of the city that will serve thousands for many generations (3.9, 3.10)
Leaders	- We will define your function in the project. Let's say, that you are a design manager, then we will define the privilege given to you, are you an internal or an external resource. You might have an access to all design document or you might have it to one specific folder (3.1, 3.2, 3.5) - All what you need to do is just given the access to that subfolder, and the there he goes and he sees the whole trace of communication from day one until the day you joined the company (3.5) - I drive through a development that I have completed, there is something deep inside laughing and smiling. Nobody can feel that more than I. It's like I have made some change, I have made some blueprint or a fingerprint. I see what I have done and my kids can see what I have done. It's feeling proud (3.3, 3.10, 3.9) - In my development - and I say mine because I feed it like its mine (3.10, 3.12) - Because when you have an incident, you are affecting not a human being but a whole chain of people that relied on that human being. So it's not just sending this guy to a hospital and forgetting about him three hours later, it's your feeling the responsibility that this gentleman losing his leg or hand would cut the bread of five

	people waiting for him (3.11) - The success of this project is my success. I care that the project succeeds (3.8, 3.10) - Its something that I feel proud of (3.9)
Design team	- We have weekly, sometimes daily, meetings with the consultant to explain to them where we have made changes, where we think the project needs to go in a different direction (3.5) - If they have spent a long time on that project, they understand where the project has started, they understand the challenges and the changes that we've made to the project, and they feel like they were are a part of those changes (3.4) - Your team consists of many different people who contribute a different aspect to the project. Not necessarily treating them as, "You are what you contribute," but, "you are part of the team and your value is just as important as anybody else" I think that that makes them, first of all, feel like they are a part of the team and they're not just a task, person who performs a task (3.3) - One of the most important things for me is I don't want a member of the team to be moved from different project. Because if you only do an aspect of it, you don't feel like it is yours. So I try to maintain that whoever works on AKO is consistent (3.1) - And I believe that when they go home, they feel like, "I was involved in this and I'm proud to see that building come up." If you're only involved in 10% of any project, you never claim it as yours. If you're involved 100%, you feel like you're a part of that team and you're a valuable part of that team (3.7, 3.9, 3.3) - I'm saying "we" of course not me, I'm the whole team (3.3, 3.10)
Suppliers	- It is good to have their name on out profiles (3.9)
- Negative significant statements about team identity	
Leader	- Perhaps, the immaturity of the project management here plays a role. Perhaps, the dynamic market that we have in UAE also plays a role. And the States people consume more time to get the project done. They don't do it as quick as we do it here, in Dubai, for example (3.4)
Consultants	- Unfortunately, very few people are genuinely motivated towards sustainability (3.12)
- Neutral significant statements about team identity	
Consultants	- You don't necessarily have to become it to create it. As long as you are governed by some requirements, people will need to meet that benchmark (3.12)
Contractors	- Interpretations. When we write formal emails or letters, sometimes people interpret in different ways. For the same aspect we have different opinions (3.4) - The information, mainly the way how each person gets the information. How we understand that information (3.4) - Sometimes you have to be one of the whole team and sometimes as a project manager you have to decide (3.2)
Leaders	- It’s very simple to detect if your team feels the loyalty and the ownership, and they have my ways of to think that (3.6) - The feeling of ownership is very essential and you can't easily see it, but you cannot apply it across the whole team (3.10) - So it's creating a spirit within the team. That spirit could be a project management technique or that spirit could be sustainability, if possible and that spirit could be as well be more open-minded to everything that happens within the development (3.3, 3.4, 3.5, 3,6)
Design team	- You don't necessarily just treat your team as doing tasks. You have to get them involved in a project. And the most important thing is they should understand why you're asking them to make, this change (3.4, 3.5) - I think that that helps them to develop internally, again. And then if somebody is proud of the work that they are doing, then they will do very good work (3.9) - It depends from one to other. Some people are feeling-- even they are not like government employees, "Oh, 5:00, I'm leaving." (3.10, 3.12, 3.3) - And of the day we are human being. Harmony depends on the manager. Are we able to manage altogether or not? (3.3)

As shown in the table above, the main positive remarks shared related to all of the team identity dimensions at an individual level and a team level. On the other hand, the negative remarks were given primarily to aspects related to common language and understanding (3.4), and behavioural involvement (3.12) that can be summarized in the following points:

- The language and cultural barrier.
- Ignorance about the innovation.

Some neutral remarks were communicated mainly moving towards being negative but the interviewees were very secure about expressing them freely. These remarks were about the miscommunication and the misunderstandings among team members.

Other neutral remarks were mostly about how aspects related to team identity, such as the sense of loyalty, ownership, sense of pride that can be achieved, did not reflect directly on whether these characteristics were present in their case or not.

6.4.4.4 Category 4: Innovation effectiveness (IE)

To revise and approve the dimensions of the category, the following chart illustrates the number of coding references in each dimension.

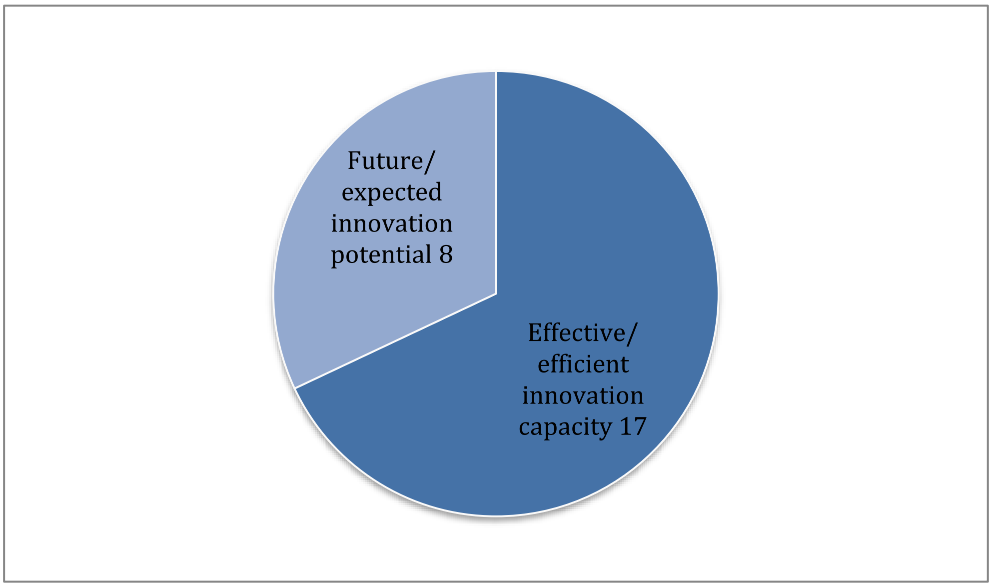


Figure 6-20: Number of coding references of IE dimensions-AKO case

Each dimension had an adequate number of coding references that indicated the trustworthiness of the dimensions and the research questions that are related to them.

The conversation with the interviewees produced 25 passages related to innovation effectiveness. The differences in responses according to the type of stakeholders is elaborated in Table 6-38.

Table 6-38: Dimension profile, category 4, IE- AKO case

	Consultants	Contractors	Leaders	Design team	Suppliers	Total
4.1 Effective/ efficient innovation capacity	5	2	2	7	1	**17**
4.2 Future/ expected innovation potential	3	0	3	2	0	**8**
Total	**8**	**2**	**5**	**9**	**1**	**25**

4.1 Effective/ efficient innovation capacity

All stakeholder groups offered remarks about the effective/ efficient innovation capacity. Since the project was still under construction at the time of data collection, they only reflected on the ongoing achievement of project goals. For example, the MEP manager (#21) said, "we are achieving far better than the requirement of the Green Building. In this case, it will enhance air-conditioning, performance as well, and efficiency." He discussed how they managed to reduce electricity consumption and water supply through technical means and to him this was a clear indication of the effectiveness of the project. He explained how they managed to save money and energy through adopting a system used in hotels (HVAC) in their villas, he said, "[t]his is saving money and energy. So rather than having the cold water going somewhere else, I am using it to cool the water tank. The same applies for heating."

Other interviewees compared their development with a conventional building and pointed out the benefits of their developments and the benefit of following the authorities' green requirements and to them; this was evidence of the effectiveness of their project. A consultant (#22) said,

> [i]f you compare between a green building or our project and a conventional building, there are a lot of benefits and a lot of contribution these buildings are giving to the society. For example, the efficiency of the AC units being selected, these units have very high efficiency compared to the normal conventional AC system that market normally buy. And the lighting systems that we are using has been well-designed so that the lighting power density is much lower than even what's mentioned in the actual standards, even the American standards. We have done much better than the international standards. And the water consumption, we can compare AKO to a probably LEED gold certified project, which is generally telling it can match with a LEED gold certified project.

The contractor (#29) mentioned that the project would be effective if they could deliver it within budget and timeframe, he said, "[i]t has to be within the budget and within the time specified for this project. These are the key elements, satisfactory handling over to the end users and within time and budget." To the supplier, it is effective in terms of materials selected, he stated, "[a]ctually they have picked the best systems in the regions so from our side it was a successful choice."

Other interviewees pointed out that there were a number of effective innovative ideas, but they were not implemented for reasons such as cost, ignorance from stakeholders, the risk that is associated with new ideas and technique, and enforcing many green regulations. A consultant (#22) said, "[w]hen many regulations are enforced, it kills the innovation. Glorifying the mediocre, that's what we are doing. It is a very mediocre sort of approach rather than going into higher degrees of sustainability."

Other interviewees thought that the project is only trying to meet the requirements, which does not make it very open for effective innovation. A consultant (#22) said, "[w]e are just basically going with what is the minimum requirement. That's where I would leave it." Another consultant (#26) agreed with that and said, "I'd say that everything that we'd proposed meets best practice, but there's no particular new innovations.

4.2 Future/ expected innovation potential

The leader, design team and the consultants provided a few remarks about the expected potential of the project but the supplier and the contractor preferred not to comment. The leader is optimistic in terms of having greener areas and enhancing the quality of air in the development with minimal use of water, he said, "[t]here will be more green areas for Oxygen and good air. At the same time, you are using natural resources, not consuming too much water." The design team agreed with him regarding this issue, “[i]t's serving two purposes. Now, it's just collecting excess water from irrigation. In the future, if the water table increases, we can take care of that water table as well.”

The lead architect (#19) thought that the success of the project is through the future achievement of a self-sustaining community where residents can find recreation, leisure, shopping, and entertainment all in one place which reduces traffic and benefits environmental sustainability he said, “…you can walk to many places. Which then helps with sustainability and makes you feel like you are a apart of that community as well. Which then improves the social aspect.”

The consultant expressed similar views to the lead architect saying that having small changes in the design can be innovative and achieve the goal, he said,

> [t]his is what I would call a passive approach to sustainability. Without introducing too many active systems, without incurring that huge cost associated with creating a second skin, which has apertures and all of this fancy technology that people are implementing these days. Just a passive approach would go along way in creating a very sustainable design.

After this coding process, the table below shows the positive, negative and neutral interviewees’ remarks about innovation effectiveness in Case 2.

Table 6-39: Stakeholders’ remarks about IE-AKO case

Type of stakeholder	Negative innovation effectiveness remarks	Positive innovation effectiveness remarks	Neutral innovation effectiveness remarks
Consultants	1	5	2
Contractors	0	1	1
Leaders	1	3	1
Design team	1	9	0
Suppliers	0	1	0
Total	3	19	4

The table above shows that there are positive, negative and neutral remarks about the effectiveness of innovation. The positive remarks are dominant (19 codes) given by the different types of stakeholder groups. The following table represents examples of significant positive, negative and neutral statements by the different types of stakeholders. The number of the related dimension follows each statement.

Table 6-40: Significant statements about IE- AKO case

Positive significant statements about innovation effectiveness	
Consultants	- Compared to a conventional building. If you compare between a green building or our project and a conventional building, there are a lot of benefits and a lot of contribution these buildings are giving to the society. For example, the efficiency of the AC units being selected, these units have very high efficiency compared to the normal conventional AC system that market normally buy. And the lighting systems that we are using has been well-designed so that the lighting power density is much lower than even what's mentioned in the actual standards, even the American standards. We have done much better than the international standards. And the water consumption, we can compare AKO to a probably LEED gold certified project, which is generally telling it can match with a LEED gold certified project (4.1) - This is what I would call a passive approach to sustainability. Without introducing too many active systems, without incurring that huge cost associated with creating a second skin, which has apertures and all of this fancy technology that people are implementing these days. Just a passive approach would go along way in creating a very sustainable design (4.2) - Actually, one other sustainable issue is the water balance, so all the water that's collected onsite, whether it's storm water or sewage water, is treated and pumped into the lakes and then it's reused for irrigation. So there's no water that actually leaves the site. For the storm water there's an oil separator, so that treats the water before it goes into the lakes. Then we go an STP, which is located down here which treats the sewage water and then gets pumped back to lakes as well (4.1) - I definitely think it will be successful (4.2)
Contractors	- It will be successful; I hope it will be successful. Success measures, for me, I have to hand it over to the end user (4.2)
Leaders	- There will be more green areas for Oxygen and good air. At the same time, you are using natural resources, not consuming too much water (4.2)
Design team	- We have ten lakes on the project, which we are using as the reservoirs. So we don't have to build underground tanks to store the water. We built lakes, basically, which is effecting aesthetically as a feature, and we using as a storing of the water, as well. So we save lot of water (4.1) - So it's working. It's basically serving two purpose. At this stage it's just to collect excess water, which is going from the irrigation. And in the future, if the water table increases, so we can take care of that water table as well (4.1) - We wanted to say, that if you wanted some recreation you could do it within AKO. You wanted leisure, shopping, and entertainment? You can do all of that in its own self-sustaining community. Which that has a lot of benefits as well. Traffic for one, maybe you can walk to a lot of the big places. Which then helps with sustainability, again. Plus then, you also feel like you are a part of that community as well. Which then helps everybody get along (4.2) - The U value, the municipality is looking for 2.1 watt per m2, let's say, We achieve 1.74, so they are far better (4.1) - We are achieving far better than the requirement of the Green Building. In this case,

	it will enhance air-conditioning, performance as well, and efficiency (4.1) - How we are doing it, using the chilled water system from the HVAC. This is saving money and energy as well. So rather than having the cold water going somewhere else, I am using it to cool the water tank. The same applies for heating. It's cooling and heating (4.1).
Suppliers	- Actually they have picked the best systems in the regions so from our side it was a successful choice.
- Negative significant statements about innovation effectiveness	
Leaders	- Because it's extremely expensive. The whole technology is not available in Dubai, so you would have to import it and you'll have to import a specialised company to get it done, to build it, and even to maintain it for like three, four years until you get a local company's knowing the new system. So that's going to cost you a fortune. No matter how much you're going to charge the people for the parking, you will never get that back. So it makes the idea killing itself (4.1).
Design team	- Now, in AKO, the site itself has Tiger Woods golf inside, so it was meant to be a golf club, with golf facilities there. Then we build the whole development around it. t's not that we said that we want Tiger Woods, no. We weren't happy that the roads be named after Tiger Woods (4.2)
Consultants	- When the regulations are enforced, it kills the innovation, right? Right now, it's what you call you're just glorifying the mediocre, that's what we are doing. I mean this is a very mediocre sort of approach rather than going into higher degrees of sustainability (4.2)
- Neutral significant statements about innovation effectiveness	
Consultants	- We are basically just going with the minimum requirement. That's where I would leave it (4.2) - I'd say that everything that we'd proposed meets best practice, but there are no particular new innovations (4.2)
Leaders	- Nothing as such that I can proudly bring it your attention and say like, "I have this innovation. It's going to be my project difference (4.2)
Contractors	- And from internal point of view, it has to be within the budget and within the time specified for this project. These are the key elements, satisfactory handling over to the end users and within time and budget (4.1)

As shown in the table above, positive remarks were the dominant ones when discussing the two aspects of innovation effectiveness, future/expected innovation potential and effective/efficient innovation capacity.

There were a number of negative remarks that reduced the overall level of satisfaction of the team members with the resultant innovation. These can be summarized in the following points:

- The enforcement of many green regulations that can stress the team and kill innovation.
- The unwillingness of some stakeholders to take risks that are usually associated with innovations.

- The unwillingness of some stakeholders to invest in innovations.
- The dissatisfaction of some team members with their partners.

In addition to that, there were a number of neutral remarks explaining that they were successful in so far as following the minimum required sustainability measures and best practices but that there weren't any new innovations produced which they were especially proud of achieving.

6.4.5 Case2 (AKO case) summary

The AKO case findings reveal that there were a variety of positive, negative and neutral remarks made on the study categories. There is a general agreement that the leader is dedicated and a very good manager, however he was not visionary and did not offer support to the team members, therefore, they did not see him as a role model and did not look up to him. The AKO case focused on stakeholder interaction as a means to integrate stakeholders, however, there were a number of challenges in achieving successful stakeholder integration. The team reflected a sense of identity and attachment that was enhanced by the cooperative working atmosphere and cohesion, however, boundaries were not very clear and there was less permeability and cognitive similarity. In addition to that, the identity of the team was challenged by a number of factors such as the language and cultural barriers and the lack of awareness of the innovation among team members. The innovation was successful in terms of the efficiency of the innovation capacity but it faced to overcome some obstacles when it came to the future expected innovation potential.

All of the stakeholder groups excluding the supplier faced challenges with integration. Consultants and leaders reflected on and revealed some negative aspects about team identity as well. The consultants, leaders, and the design team pointed out some challenging aspects in relation to the effectiveness of the innovation. The following table illustrates stakeholders' perceptions about the study categories.

Table 6-41: Stakeholders' perceptions about the conceptual model categories (+ for positive, - for negative)

Type of stakeholder	Leadership for innovation	Stakeholder integration	Team identity	Innovation effectiveness
Consultants	+	+, -	+, -	+, -
Contractors	+	+, -	+	+
Leaders	+, -	+, -	+, -	+, -
Design team	+	+, -	+	+, -
Suppliers	N/A	+	+	N/A

Table 6-42 illustrates that the most discussed dimension was stakeholder interactions and the least mentioned one was self-categorization.

In leadership for innovation, the leader was not a visionary man and could not present himself as a role model. Team members pointed out that there was a sense of hierarchy and segregation between the leader and the team members, therefore sharing information and communicating was not open between them. The leader also faced some challenges in integrating stakeholders due to some cultural and language barriers, but he was able to find ways to understand them and know their needs and demands and cope with them accordingly. Still, stakeholders faced challenges due the miscommunication and the ignorance of some stakeholders on the innovation. Another challenge that they encountered was the late integration of some of them and the late notice of the changes in scope, requirements and designs.

Compounded with these problems, the slow responses and routine work from authorities and the inability to adapt to some stakeholders' behaviours. Similarly, the team faced some challenges due to language and cultural barriers and the ignorance about the innovation among the team members. Relatedly, the team itself was not very positive about the effectiveness of the sustainable innovations in their project. They attributed that to the unwillingness of some major stakeholders to take risks that could be associated with innovations and the enforcement of many green regulations, which they said stressed them out and killed innovation.

Table 6-42: The perception of the different categories and their dimensions- AKO case

Conceptual thematic framework	Number of coding references	Perception
1. Leadership for innovation		
1.1 Encouraging and stimulating innovation	13	+
1.2 Providing and inspiring vision	4	+
1.3 Individualized support	9	+
1.4 Teamwork development	11	+
1.5 Stakeholder integration	25	+, -
2. Stakeholder integration		
2.1 Knowledge of stakeholders	68	+, -
2.2 Stakeholders interactions	76	+, -
2.3 Behaviours adaptation	59	+, -
3. Team identity		
Team level:		
3.1 Boundary clarity	4	+
3.2 Boundary permeability	5	+
3.3 Cohesion	9	+
3.4 Common language and understanding	11	+, -
3.5 Cooperative working atmosphere	19	+
3.6 Cognitive similarity	3	+
Individual level:		
3.7 Self-categorization	1	+
3.8 Evaluation	2	+
3.9 Importance	10	+
3.10 Attachment and sense of interdependence	21	+
3.11 Social embeddedness	2	+
3.12 Behavioural involvement	10	+, -
3.13 Content and meaning	0	0
4. Innovation effectiveness		
4.1 Effective/efficient innovation capacity	17	+, -
4.2 Future/expected innovation potential	8	+, -

6.5 Case 3 Interpretation and results

6.5.1 Case3 (The JFZ project) overview

JFZ is a staff accommodation project, which comprises of three junior block buildings. The project claims that it is sustainable in the architectural choices of the buildings that provide natural shading and wind circulation and it terms of the products and materials used in construction. The project uses 3D panels instead of bricks for building walls. The product itself is not new in the market, however JFZ is the first project developed in DW that uses it, so it is considered an innovation within the boundaries of the organization.

6.5.2 Participants profile

A summary of the participants of the interviews is illustrated in Table 6-43 below.

Table 6-43: Participants of the interviews in the JFZ case

Interviewee number	Type of stakeholder	Position
#31	Design team	Senior engineer
#32	Leader (Client)	VP engineering
#33	Leader (Client)	Senior project manager
#34	Leader (Client)	Head of engineering department
#35	Consultant	Design consultant
#36	Contractor	Project manager-contracting
#37	Design team	MEP Engineer
#38	Design team	Architect

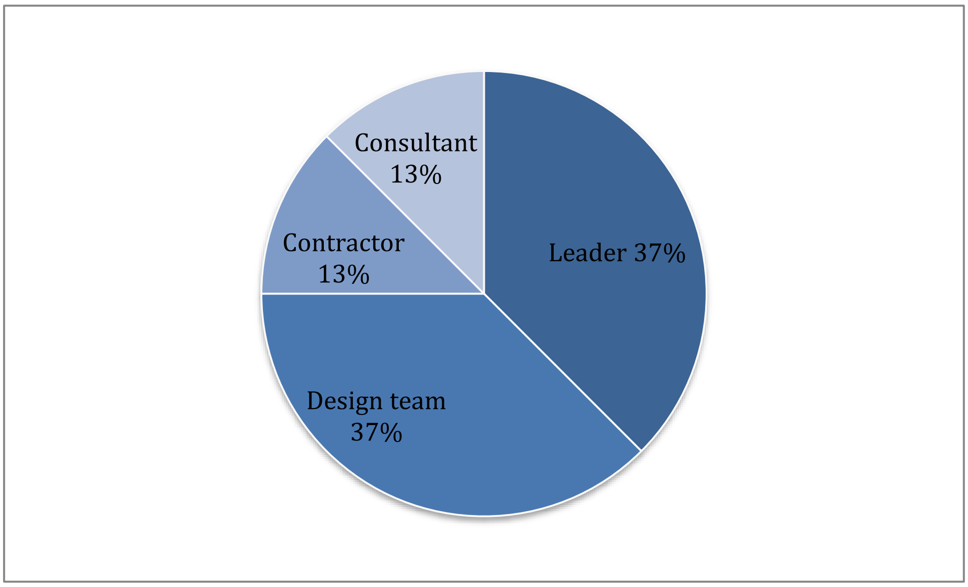


Figure 6-21: The interview participants-JFZ case

6.5.3 Case study context

The following chart represents the number of coding references for each open innovation dimension. It reveals that the JFZ case had used some means of open innovation such as employee involvement, inward IP licensing and external participation, and outsourcing R&D and external networking.

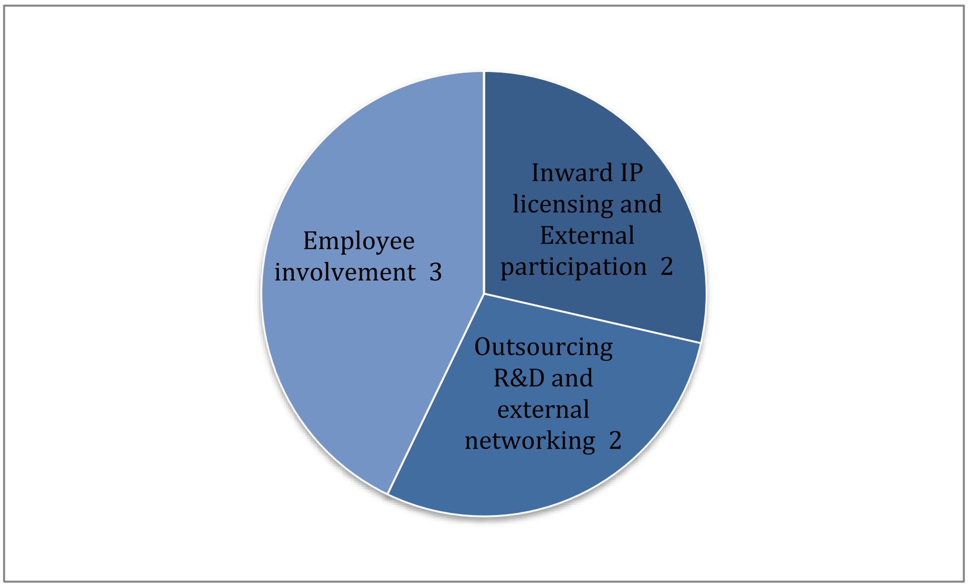


Figure 6-22: Number of coding references of open innovation dimensions- JFZ case

6.5.4 Interview interpretation and results

6.5.4.1 Category 1: Leadership for innovation (LI)

To analyze the dimensions of leadership for innovation in the JFZ case, the number of coding references in each dimension was calculated and illustrated in the following chart.

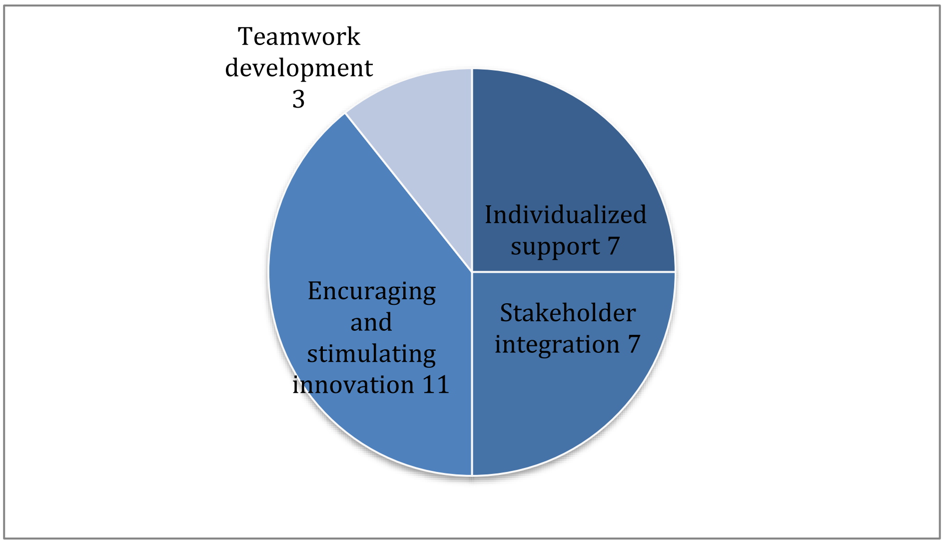


Figure 6-23: Number of coding references of LI dimensions-JFZ case

The interviewees mentioned all dimensions except ‘providing and inspiring vision’ in their conversation about leadership for innovation. A sufficient number of coding references for each dimension were noted, excluding ‘team work development’. Yet, the researcher decided to retain the dimension and decide whether to consider it or not at a later stage in the analysis.

The contribution of 6 out of 8 interviewees produced 28 related passages within the category leadership for innovation. The dimensions profile in Table 6-44 further elaborates the differences in responses in the dimensions in terms of the four types of stakeholders.

Table 6-44: Dimension profile- LI- JFZ case

	Consultants	Contractors	Leaders	Design team	Total
1.1 Encouraging and stimulating innovation	1	0	4	6	**11**
1.2 Providing and inspiring vision	0	0	0	0	**0**
1.3 Individualized support	0	0	3	4	**7**
1.4 Teamwork development	2	0	0	1	**3**

1.5 Stakeholder integration	2	0	2	3	**7**
Total	**5**	**0**	**9**	**14**	**28**

1.1 Encouraging and stimulating innovation

This dimension was the most frequently mentioned. The leader, design team and consultants reflected and elaborated on it. The leader's view about it is that he wanted the project to be up to the standards to satisfy the government, so he was encouraging his team to look for more sustainable options, he mentioned, "[w]e wanted the project to be up to the standards that are expected from us from the government. So we wanted to make it more sustainable environmentally, socially and financially."

In his view, encouraging the team is through incentives, he stated, "[t]he main motivation for the team is the rewards and awards that are given to the productive employees yearly so it's a kind of an incentive to produce good quality work."

In contrast, the team held a different view about their leader, they don't see their leaders as encouraging or stimulating innovation, a senior engineer (#31) said, "sometimes they don't listen to us, or it needs a lot of time and effort to reach them, so I think many ideas are killed instantly even before trying to express them." The architect agreed with him and said, "…I mean they say they want to have a project that is sustainable but they don't give us enough space, time and resources to think about it and come up with new innovations."

They also added that their leader is harsh and tries to please the top management therefore, he tries to play it safe and not stimulate new innovations that can be risk associated, the architect (#38) said, "…he tries to please them as much as he could.

He doesn’t challenge their ways of doing things. I think he’d rather be on a safe side and deliver what is required from him.”

1.3 Individualized support

The leaders and the design team reflected on this dimension. The leader (#32) thought that supporting his team could be achieved through closing an eye to their mistakes and providing them with motivation. He mentioned, “I motivate them by appreciating what they do and closing an eye to some mistakes.” Whereas #34 supported them through using his power to solve problem, he said, “if there is any kind of conflict or problems, we interfere and try to judge accordingly.” The MEP engineer (#37) reflected on this dimension through mentioning that their leader guided them and gave them support, “regarding the leader of the project, well, he is professionally very good, he guides us and gives instructions.”

The architect (#38) had a direct manager who reported to the project leader, he thought that the trust that his manager provided gave him the motivation to work, he mentioned, “we also get motivated when our managers trust us. For me, my direct manager shows trust and he acknowledges what we do, this gives us a good push to work and do out best.”

1.4 Teamwork development

The interviewees did not frequently highlight this dimension. Only the consultant and the design team offered some remarks. The consultant mentioned that they had meetings and discussions to share information and knowledge among the team and to motivate them to work, he said:

> [w]e have weekly internal meetings, we generally coordinate the site issues on a day to day basis, but the weekly meetings help us to build the team and of course, we have to motivate the team, and charge them for the personal benefits and better carrier options. These make them on their toes, they work better and try to achieve more.

The senior engineer explained their routine teamwork in depth and highlighted how they managed it. There weren't many comments reflecting how leaders promoted and managed teamwork.

1.5 Stakeholder integration

Consultants, leaders and design team reflected on this dimension in different ways.

The senior Engineer (#31) mentioned aspects related to the communication and engagement that took place between the different stakeholders. He said:

> …all this communication between each other, they do it together. So the consultant verifies and reviews the variation and gives us feedback and then after our approval he deals with the contractor. It's not that simple sometimes. Sometimes the contractor is in the middle of something, for example if we changed the paint, we sometimes the contractor have purchased half of the quantity that was there in the original scope of work. So here he talks to the client and says I have paid this much already, I either tell him that you can put the purchased quantity in our stores or we talk to the supplier and convince him to return the quantity and so on.

The VP of Engineering (#32) complained that the department head and the owner did not listen to them and did not take their opinions for assigning consultants and contractors, he mentioned, "sometimes when it comes to approvals and assigning consultants and contractors, they don't really take our opinions. Sometime we feel that they force them on us." Whereas, the head of the department mentioned that they facilitate innovation through assigning the right stakeholders, he said, "we just facilitate it further through assigning the right stakeholders."

The consultant stressed the importance of communicating with different stakeholders and knowing how they can benefit their project, he said, “we found that their submission is the most efficient submission from time perspective, from money cost saving, from man power saving, overall they were better. So we selected them.” The architect (#38), however, declared that they were not given enough freedom to express their thoughts and ideas by the leader, therefore, they couldn’t try their best to enhance the sustainability aspect of the project, he said, “…we’d have more courage to discuss ideas with him, we’d try to express our thoughts freely. The leader influences that a lot because he is the connection between the executive level and us.”

After this coding process, the codes were categorized into positive, negative and neutral remarks based on the coding agenda represented in Table 6-45.

Table 6-45: Stakeholders’ remarks about LI- JFZ case

Type of stakeholder	Negative leadership for innovation remarks	Positive leadership for innovation remarks	Neutral leadership for innovation remarks
Consultants	0	2	2
Contractors	0	0	0
Leaders	2	5	2
Design team	5	6	0
Total	7	13	4

The table shows that stakeholders varied in giving positive, negative and neutral remarks about leadership for innovation in the JFZ case. The design team articulated the most positive remarks (6 codes) followed by the leaders (5 codes), and the consultant. The contractor did not offer any obvious remarks about leadership for innovation. Five remarks from the design team and two from the leader were negative. The following table represents examples of significant positive, negative and neutral statements by the different types of stakeholders. The related dimension’s number followed each statement.

Table 6-46: Significant statements about LI- JFZ case

Positive significant statements about leadership for innovation	
Consultants	- We have weekly internal meetings, we generally coordinate the site issues on a day-to-day basis, but the weekly meetings help us to build the team and of course, we have to motivate the team, and charge them for the personal benefits and better carrier options. These make them on their toes, they work better and try to achieve more (1.4)
Leaders	- I motivate them by appreciating what they do and closing an eye to some mistakes (1.3). - We were also looking for more sustainable materials especially while tendering (1.1). - We just facilitate it further through assigning the right stakeholders (1.5) - If there is any kind of conflict or problems, we interfere and try to judge accordingly (1.3)
Design team	- The developer then approached the consultant to verify the product, is this ok? Is the idea implementable and viable? The consultant approved (1.5) - All this communication between each other, they do it together. So the consultant verifies and reviews the variation and gives us feedback and then after our approval he deals with the contractor. It's not that simple sometimes (1.4, 1.5) - Regarding the leader of the project, well, he is professionally very good, he guides us and gives instructions (1.3) - The reward system is good in the company as well. There is an annual award to the best employee in each department and we usually try to achieve it. It is good in our profiles (1.1) - We also get motivated when our managers trust us. For me, my direct manager shows trust and he acknowledges what we do, this gives us a good push to work and do out best (1.3)
Neutral significant statements about leadership for innovation	
Consultants	- We found that their submission is the most efficient submission from time perspective, from money cost saving, from man power saving, overall they were better (1.5) - In the meanwhile the process of tendering, evaluating, tender evaluation reports are the parallel issues that were going on so the panel contractor were the lowest I suppose and they got the contract (1.4, 1.5)
Leaders	- We wanted the project to be up to the standards that are expected from us from the government of Dubai. So we wanted to make it more sustainable from the environmental, social and financial aspects (1.1) - A contractor that proposed a 3D paneling technique for the indoor walls grabbed our attention and we made a deal with him (1.1)
Negative significant statements about leadership for innovation	
Leaders	- They are not very involved in the project, they tell us to do this and that, then they only monitor (1.3) - But sometimes when it comes to approvals and assigning consultants and contractors, they don't really take our opinions. Sometime we feel that they force them on us (1.5)
Design team	- This is a dangerous question. Well they are not very involved with the details of the project. But the major approvals and orders come from them. Sometimes they don't listen to us, or it needs a lot of time and effort to reach them to discuss something, so I think many ideas are killed instantly even before trying to express them (1.1) - I mean they say they want to have a project that is sustainable and green but at the same time, they don't give us enough space, time and resources to think about it and come up with new innovations (1.1) - The team leader is a bit harsh and he doesn't have a good leadership style in my opinion. He is the kind that threatens, shouts and imposes things. We try to avoid him sometimes (1.1) - But it would have differed in terms of sustainability and innovation. We would have more courage and well to discuss ideas with him, we would try to express our thoughts freely and so on if you know what I mean. The leader influences that a lot. Because he is the connection between the executive level and us (1.5) - Our leader doesn't really do that. He tries to please them as much as he could. He doesn't challenge their ways of doing things. I think he'd rather be on a safe side and deliver what is required from him and that's it (1.1)

The table above shows that the positive remarks covered all leadership for innovation dimensions, while the negative remarks were mainly about the 'encouraging and stimulating innovation' dimension, one about stakeholder integration, and one about individualized support. It is apparent from the case that the negative remarks were attributed to the following aspects:

- Many levels of leadership and hierarchy
- Organizational politics
- The segregation between leaders and the team
- Poor team engagement especially in decision-making and innovation

The different interviewees expressed how they want to achieve sustainability and innovation in their project through their neutral remarks but they were not able to achieve it in their project due to organizational politics and discouraging leadership.

6.5.4.2 Category 2: Stakeholder integration (SI)

To revise and approve the dimensions of the category, the following chart illustrates the number of coding references in each dimension.

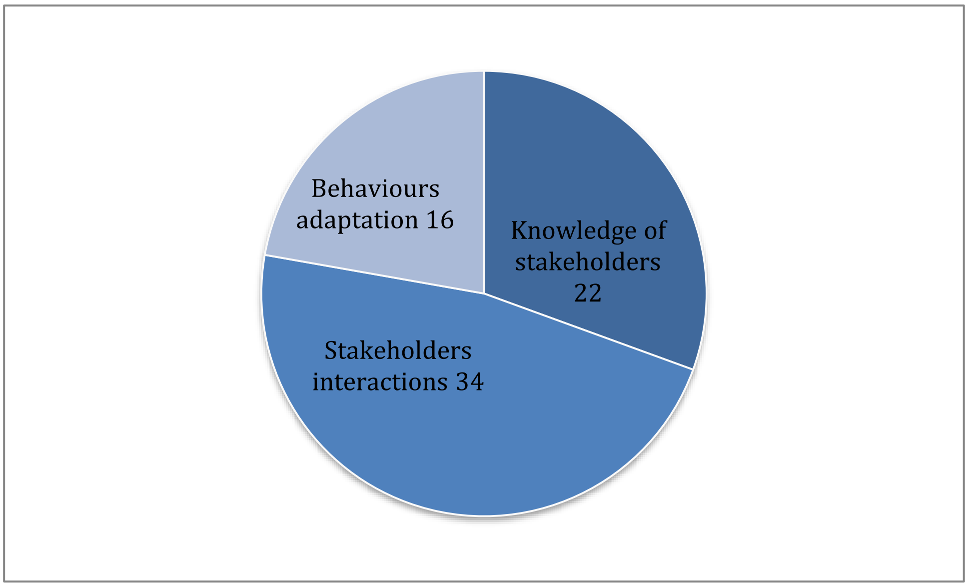


Figure 6-24: Number of coding references of SI dimensions-JFZ case

An adequate number of coding references for each dimension was attained in this category, which indicated that trustworthiness of the dimensions and the research questions that are related to each one.

The interview dialogue about stakeholder integration produced 71 related passages, with the involvement of 8 out of 8 interviewees. This category was divided into three dimensions. The following dimensions profile illustrates the number of responses by the four stakeholders for each dimension.

Table 6-47: Dimension profile- SI- JFZ case

	Consultants	Contractors	Leaders	Design team	Total
2.1 Knowledge of stakeholders	1	0	7	14	**22**
2.2 Stakeholders interactions	8	8	6	11	**33**
2.3 Behaviours adaptation	6	2	2	6	**16**
Total	**15**	**10**	**15**	**31**	**71**

2.1 Knowledge of stakeholders

The table above shows that the design team and leaders frequently mentioned knowledge of stakeholders while the contractor presented no remarks on this topic.

The design team was aware of the different stakeholders they were dealing with and their influence on the project, the MEP engineer (#37) said, "[o]ur relationship is good with the authorities, I have worked on such projects for 10 years, I know exactly what they need and the type of documents they need." He added that knowing the stakeholders helped them to get approvals quickly:

> …they are very systemized, their regulations are very clear. However, sometimes they are slow in issuing approvals. When we need to get approvals fast, our manager approach them, he has very good relationship with some people who work their and they share mutual benefits so they usually give him approvals faster and so on.

Another design team member, the senior engineer, pointed out the importance of devoting time and budget to getting to know stakeholders, he mentioned, "…then comes the technical comparison, are they able to deliver, we check the number of his labor, his experience, his equipment. We check if we are confident to give him the job." He also mentioned that they selected the new contractor with the 3D panels to achieve their sustainability target and because he proposed a reasonable price, so prior to this process, they devoted time to learn about this, he mentioned, "…So this was attractive to us because he gave us good price and a shorter time which means the client will rent earlier and will make more money."

From their different perspective on knowledge of stakeholders, the design team raised some negative aspects. They mentioned that the top management select stakeholders based on cost mainly, (#31) said, "[n]ormally, what matters to the developer or client is the cost, and according to it tendering happens." He added that the top management refused to hire the consultant that worked with them in phase 1 of the project because they found another cheaper one although it would have been much easier to work with the one who was there in phase 1 because they knew each other. The architect seemed to share this viewpoint and said, “They want the project to finish as fast as possible to have the financial benefits as soon as possible. If this product cost more, they wouldn’t go for it. Politics and money are major players here.”

Conversely, the head of the engineering department (#34) pointed out that the criteria for selecting stakeholders is primarily based on their knowledge about them, their reputation, experience, mutual benefits, etc. He mentioned, “Sometimes my colleague recommends one for me because he has previous experience with him, sometimes we have mutual benefits, and sometimes we pick the most efficient one among different consultants and contractors.”

The leader (#33) discussed the importance of knowing stakeholders since the beginning of the project, he said, “this is a challenging task but at the beginning of every project onsite we have something called kick off meeting. In this meeting, I introduce myself strongly to the contractor, consultant, and the stakeholders.”

2.2 Stakeholder interaction

Stakeholder interactions was the dominant dimension mentioned by the different stakeholders (36 codes), produced by the 8 interviewees. The leader asserted the importance of having intensive and frequent communication with and among stakeholders. The VP of engineering (#32) said:

> [s]ometimes there is a change in the scope of work, a variation, the contractor immediately says that it require X amount of money, then we go to the consultant and the consultants say no, it requires less or more. Because as a client sometimes we don’t have the expertise about this specific issue do to save time we immediately go to the consultant. So they communicate among each other and then the consultant comes back to us with his feedback.

The design team agreed with him about this point, the senior engineer (#31) said, "[t]he developer approached the consultant to verify the product, asked if it is ok, is the idea implementable and viable? The consultant approved. So this sort of communication is vital." However, he thought that the construction industry is weak in this area, and the routine system does not stimulate adequate communication between stakeholders. He mentioned:

> [t]he problem in construction is that it's a harsh industry, if I could write the procedure to deliver a building, it will be the same way it happened in the 80's. Kick off meeting, all parties introduced to each other, identify responsibilities, assign responsibilities, identify what is needed from the client, establish weekly progress meetings, dates, establish methodologies for monthly progress reports, establish responsibilities and that's it. Then it's running a daily thing, contractors busy delivering, consultants make sure that specifications are met and that he is meeting his own satisfaction. And the client fulfilling his responsibilities by paying on time, not overpaying, not being fooled by the contractor and consultant, meeting the requirements of the authorities and facilitating collaboration and communication as and when required. Otherwise the interaction of the client is minimal.

He continued the conversation by complaining that the leaders did not listen to them or take their opinions into consideration because they wanted the project to be delivered as soon as possible.

The architect agreed with him and said, "I don't usually share them because I know that they wouldn't accept them due to cost and risk."

Other interviewees, such as the consultant and contractor, described the importance of coordination between the different stakeholders. The contractor (#36) explained that the lack of coordination, especially with the sub-contractors, is a major cause of problems, he said, "...sometimes some subcontractors damage the other subcontractor work or products and sometimes their work is not parallel with each other. So the daily coordination between the different subcontractors is challenging."

He added, “we should work more on improving the coordination between the different sub-contractors to avoid problems.”

The consultant (#35) agreed about this point but he was more neutral in his evaluation, he said, “[w]e have at least 18 to 19 subcontractors onboard we have to deal with and coordinate on daily basis.” He added that it is important to educate stakeholders and have a common understanding, “…all of these people have to be in a common understanding and have to be coordinated properly to achieve the goal of completion.”

The architect was more positive regarding this matter, he said, “…there is a change management process. We revised the plan with the consultant, we usually discuss our requirements with them and they respond to us. It was manageable.”

2.3 Behaviours adaptation

The interviewees discussed behaviours adaptation in their conversations. The leader reflected on how they dedicated time and effort to meet stakeholders’ demands and resolve any arising conflicts.

The consultant (#35) described how they sometimes needed to change their designs in line with the client’s demands and how they spent time to make information available, he said, “[t]he design will be reviewed entirely, changed and revised based on the requirements of the client. All of the implications will be communicated with the client.”

The contractor (#36) shared the same thought and said, "[w]e submitted some drawings to the authorities; they asked us for very small changes that are manageable and we changed them accordingly."

The architect (#38) explained how they started the design in a conventional way, and then they introduced the 3D panels instead of blocks for walls. So they had to change the design accordingly and get approvals, he mentioned, "…we had to revise the design accordingly and get the approvals of the authorities like TARAKHEES after tendering." He continued by discussing how challenging this was, "…we need to finish at a specific period of time and the authorities are slow sometimes. And here, they gave us a very stressful time, so we were on the run."

The table below is the result of the coding and categorizing of text into positive, negative and neutral interviewees' remarks about stakeholder integration in the JFZ case.

Table 6-48: Stakeholders' remarks about SI-JFZ case

Type of stakeholder	Negative stakeholder integration remarks	Positive stakeholder integration remarks	Neutral stakeholder integration remarks
Consultants	0	7	4
Contractors	2	3	3
Leaders	3	7	4
Design team	9	12	6
Total	14	29	17

As shown in the table above, there were a variety of remarks made about stakeholder integration in the JFZ case. Positive remarks were the most frequent ones (29 codes) followed by neutral (17) and negative remarks (14). The following table represents examples of significant positive, negative and neutral statements by the different types of stakeholders. The number of the related dimension follows each code.

Table 6-49: Significant statements about SI-JFZ case

Positive significant statements about stakeholder integration	
Consultants	- In the meanwhile the process of tendering, evaluating, tender evaluation reports are the parallel issues that were going on so the panel contractor were the lowest I suppose and they got the contract (2.2) - The clients initiatives, we also brought green building consultants on board, and environmental friendly designs as these building comply with green building requirements. And most our products, including the paving blocks, interlock blocks, windows, doors, chemicals we are using on site, all of these we are taking the consent of our green building consultant. Once she approved them, we are allowed to use them on site (2.2) - The design will be reviewed entirely, changed and revised based on the requirements of the client. And there is also the cost implication, time implication; all of the implications will be communicated with the client. So there is a change management process already established and we follow it. (2.3)
Contractors	- So far their specifications are very clear. So far we were facing some small minor problems and we go back to them and we solve any problem immediately (2.2) - We submitted some drawings to the authorities; they asked us for very small changes that are manageable and we changed them accordingly (2.3)
Leaders	- Sometimes we have to resolve the conflicts that happen between them, we have to have fair judgments. For example sometimes there is a change in the scope of work, a variation, the contractor immediately says that it require X amount of money, then we go to the consultant and the consultants say no, it requires less or more or whatever. Because as a client sometimes we don't have the expertise about this specific issue do to save time we immediately go to the consultant. So they communicate among each other and then the consultant comes back to us with his feedback (2.3) - We designed along with the consultant (3.2) - This a challenging task but at the beginning of every project onsite we have something called kick off meeting. In this meeting I introduce myself strongly to the contractor, consultant, and the stakeholders (2.2) - Reference 1: 6.11% coverage - We were also looking for more sustainable materials especially while tendering. A contractor that proposed a 3D paneling technique for the indoor walls grabbed our attention and we made a deal with him (2.1) - Based on their reputation in the market and previous experiences with them. Sometimes my colleague recommends one for me because he has previous experience with him, sometimes we have mutual benefits, sometimes we pick the most efficient one among a list of different consultants and contractors (2.1) - If there is any kind of conflict or problems, we interfere and try to judge accordingly (2.2)
Design team	- Normally, what matters to the developer or client is the cost, and according to it tendering happens (2.1) - The developer approached the consultant to verify the product, asked if it is ok, is the idea implementable and viable? The consultant approved. So this sort of communication is vital (2.2) - Then comes the technical comparison, are they able to deliver, we check the number of his labor, his experience, his equipment. We check if you are confident to give him the job (2.1) - All this communication between each other, they do it together. So the consultant verifies and reviews the variation and gives us feedback and then after our approval he deals with the contractor. It's not that simple sometimes (2.2) - They were very collaborative and the communication between us was professional and smooth (2.2) - We also dealt with authorities; we were developing the plan responding to the different authorities rules and regulations. Our relationship is good with the authorities, I have worked on such projects for 10 years, I know exactly what they need and the type of documents they need (2.1) - They are very systemized, their regulations are very clear. However, sometimes they are slow in issuing approvals. When we need to get approvals fast, our manager approach them, he has very good relationship with some people who work there and they share mutual benefits so they usually give him approvals faster and so on (2.1) - We worked along with the consultant to do the necessary changes; there is a change management process. We revised the plan together, we usually discuss our requirements with the consultants and they respond to us. It was manageable (2.2, 2.3)
Negative significant statements about stakeholder integration	

Contractors	- When we are executing the work. Sometimes some subcontractor damages the other subcontractor work or products and sometimes their work is not parallel with each other. So The daily coordination between the different subcontractors is challenging, sometimes there is lack of coordination between them and this is what causes the problems (2.2) - Because there is certain time frame. We are having only 13 months to complete the entire project. All the subcontractors have to work parallel and simultaneously to complete their work so they want to finish their work. So they really don't care about others and want to finish what they have so sometimes they don't communicate because it takes time and might hinder their work (2.2)
Leaders	- Most consultants are not honest, I'm working 32 years in this sector, and there is a lot of corruption between contractors and consultants behind the client. If the client is not very knowledgeable and he doesn't have his in-house engineers, he relies solely on consultants and contractors, if a specific contractor is assigned and this contractor does not pay bribes, the consultant knows that he doesn't take bribes. So the consultant talks to another contractor and tells him I'll give you this project but tell me how much you will pay me? So they make an arrangement and the consultant goes to the client and tells him that the contractor they picked is not very good and does not have enough labor and equipment. So the client says I want my project to be of good quality. So the consultant recommends the other contractor, but he says it might be a bit more expensive, the client agrees because he wants quality work. And the consultant puts the money in his pocket at the end of the day. So he betrays the client (2.1) - Although it would have been easier to deal with the previous one (2.1) - Sometimes it is not easy to deal with them. They are very aggressive in the fact that they want to fulfill their own needs and benefits and this annoys us as clients (2.2, 2.3)
Design team	- We had a specific consultant in phase 1, in phase 2 they appointed another one although it would have been much easier to work with the one who was there in phase 1 because he is familiar with us and we are familiar with him but his price was high for phase 2, and it did not need a lot of work from the consultants side because it's a copy-paste work from phase1 with some few changes. The drawings and specifications are already there. So we went for the more reasonable price (2.1) - The problem in construction is that it's a harsh industry, if I could write the procedure to deliver a building, it will be the same way it happened in the 80's. Kick off meeting, all parties introduced to each other, identify responsibilities, assign responsibilities, identify what is needed from the client, establish weekly progress meetings, dates, establish methodologies for monthly progress reports, establish responsibilities and that's it. Then its running a daily thing, contractors busy delivering, consultants make sure that specification are met and that he is meeting his own satisfaction. And the client fulfilling his responsibilities by paying on time, not overpaying, not being fooled by the contractor and consultant, meeting the requirements of the authorities and facilitating collaboration and communication as and when required. Otherwise the interaction of the client is minimal (2.2) - It doesn't happen like this here, they say you checked the designs? Yes we checked but it needs 1, 2, 3. They say I promised this guy to start now. So we have to award the project at this specific date. This is how it goes (2.2) - They have assigned a new consultant so we had to deal with new people and get to know them and how they think and so on (2.1) - I usually communicate with my manager and he updates him and so on. He can very strict sometimes, he is kind of loud and this bothers me sometimes. So I am happy that I don't have a direct contact with him (2.2) - They want the project to finish as fast as possible to have the financial benefits as soon as possible. And believe me, if this product would have cost more, they wouldn't go for it. Politics and money are major players here between me and you (2.1) - But I don't usually share them because I know that they wouldn't accept them due to cost and risk (2.2) - And to be honest, this project and in most of our construction projects here, they build them conventionally and the major drive is revenues. We are a trading and logistics company, we don't really develop fancy projects to grab media's or customers attention. Mostly we build because the customers have a need, and they will take it anyway (2.1)
Neutral significant statements about stakeholder integration	
Consultants	- We have at least 18 to 19 subcontractors onboard we have to deal with and coordinate on daily basis (2.2) - Because these people manufacture and they do the construction process. So they were the best and lowest in the contract bidding process, the got it. So they supply the product and apply it (Supply-apply) (2.1) - Everyone is having their own ideas and we have to bring them onboard and to bring them to common understanding (2.2)
Contractors	- We would work more on improving the coordination between the different sub contractors to avoid problems (2.2)

	- So if there is a way to facilitate this coordination in an easier manner it would really improve the project (2.2)
Leaders	- Dubai in general is going through a change in the construction sector, they are moving towards making their projects greener and more sustainable (2.1) - It depends on the consultants and contractors as well. Sometimes its easier to trust local ones, they are more honest and they care about their reputations. So based on reputation, previous experiences (2.1) - Collaboration is a requirement in construction projects; we just facilitate it further through assigning the right stakeholders and through monitoring their progress (2.2)
Design team	- So when this contractor came into the picture he came with an extra offer, I have 3D paneling and I will deliver before the due date. So this was attractive to the developer because he gave us good price and a shorter time which means the client will rent earlier and will make more money (2.1) - For me if I have a previous experience with a consultant or a contractor that I have previous bad experience with, I draw back from the project because I know if the executive level approved him, he will work anyway regardless of my opinion (2.1) - You know what I mean? Its important to have good relations with the authorities, makes the job much easier and faster (2.1)

As shown in the table above, positive and negative remarks were given to all of the stakeholder integration dimensions while the neutral ones were mainly related to knowledge of stakeholders and stakeholder interactions. The major negative remarks were attributed to the following aspects:

- Lack of coordination between the contractor and the sub-contractors.
- Poor communication from the sub-contractors' side.
- Lack of trust between the client, the contractor and the consultant.
- Corruption.
- The routine construction process that discourage communication.
- The replacement of a known and trusted stakeholder with a new one for financial reasons.
- Revenue-driven decisions from the leaders.
- The lack of integration of the design team in the decision-making process.

The neutral remarks were promoting for obtaining knowledge about the stakeholders and enhancing the communication and coordination among them.

6.5.4.3 Category 3: Team identity (TI)

To revise and approve the dimensions of the category, the following chart illustrates the number of coding references in each dimension.

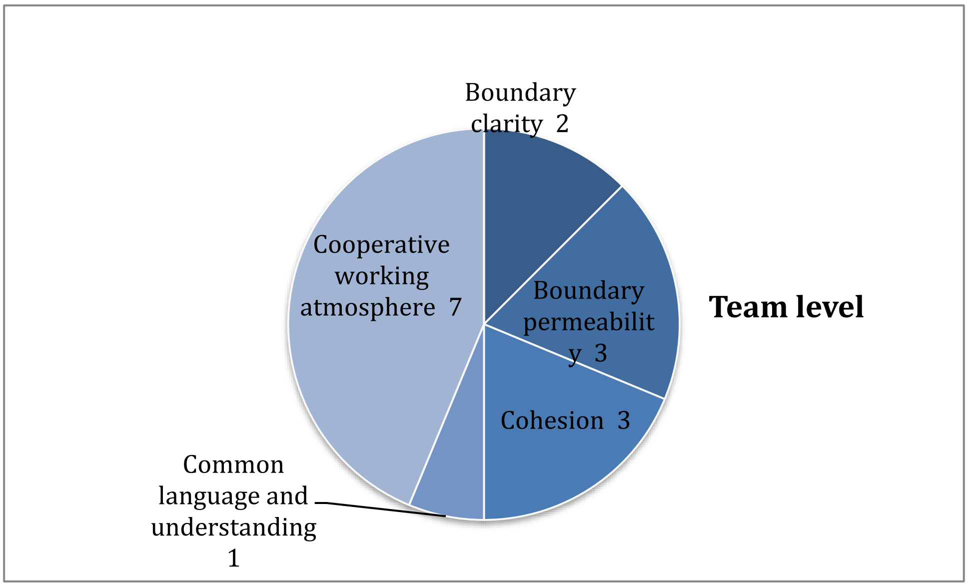


Figure 6-25: Number of coding references of team level TI-JFZ case

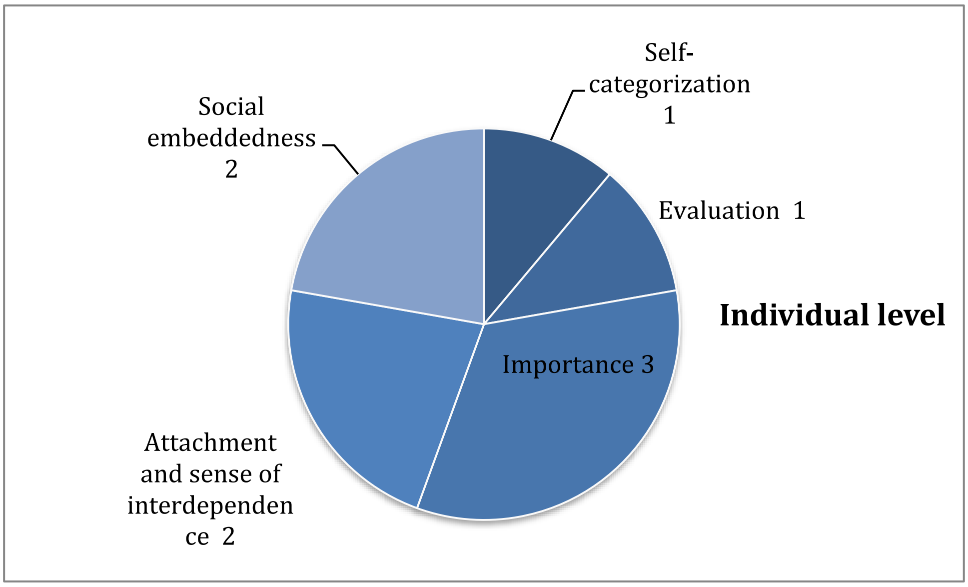


Figure 6-26: Number of coding references of individual level TI - JFZ case

Team identity dimensions at a team level and individual level were evident in the conversation with the different interviewees. The dimensions (content and meaning, behavioural involvement, and cognitive similarity) were not mentioned and so they were excluded from the analysis. Some dimensions, especially the ones related to the individual level, were barely mentioned such as, behavioural involvement, content and meaning, self-categorization and evaluation. Overall, the interviewees did not reflect on these dimensions willingly.

The dimensions profile in Table 6-50 further elaborates the differences in the responses amongst the dimensions in terms of the four types of stakeholders.

Table 6-50: Dimension profile- TI- JFZ case

	Consultants	Contractors	Leaders	Design team	**Total**
Team level:					
3.1 Boundary clarity	0	1	0	1	**2**
3.2 Boundary permeability	0	0	0	3	**3**
3.3 Cohesion	0	0	0	3	**3**
3.4 Common language and understanding	1	0	0	0	**1**
3.5 Cooperative working atmosphere	1	1	1	4	**7**
3.6 Cognitive similarity	0	0	0	0	**0**
Individual level:					
3.7 Self-categorization	0	0	0	1	**1**
3.8 Evaluation	0	0	0	1	**1**
3.9 Importance	0	0	2	1	**3**
3.10 Attachment and sense of interdependence	0	0	0	2	**2**
3.11 Social embeddedness	0	0	0	2	**2**
3.12 Behavioural involvement	0	0	0	0	**0**
3.13 Content and meaning	0	0	0	0	**0**
Total	**2**	**2**	**3**	**18**	**25**

Team level

3.1 Boundary clarity

The contractor and the MEP manager mentioned boundary clarity. The contractor (#36) reflected on this dimension through mentioning how each subcontractor knows his specifications in the team, which makes them, clear about the team they belong to, he mentioned:

> [a]pproximately 20 subcontractors are working now. And each one of them have their own specifications and all kinds of regulations. So all subcontractors are players as well. And finally they have to comply and adopt according to our design and the concept specifications.

The MEP engineer asserted a significant degree of clarity on the team that he belonged to and directly stated that he was part of it, he said, "[w]e all work on it for a specific period of time, so at that time, we feel that we are part of it, when we pass through it, we feel that its our project."

3.2 Boundary permeability

Only the design team mentioned boundary permeability in these interviews. They pointed out how expertise was exchanged within the team, the senior engineer (#31) said, "[w]e work together in a professional way, everyone helps the other when needed." The MEP engineer and the architect agreed; the architect (#38) said, "[w]e help each other as a team. Each one of us has a different background and experience so we use that in complementing each other's work."

3.3 Cohesion

The design team was the only stakeholder to reflect on this dimension. It was obvious that there was a relational bond between the different design team members. Though this relationship was not present amongst the other stakeholders. The MEP engineer said, "[m]y direct manager is not the leader of the project. He gives me some instructions and I follow. He is a good person, we are like friends, I have lunch with him occasionally." The architect also offered similar remarks, he said, "[s]ome of us are not only colleague but also friends, we grab lunch together, we go out together and so on, and others we only have a professional relationship with."

3.4 Common language and understanding

This dimension was only mentioned once by the consultant. He mentioned that the diversity of the team can lead to many ideas and there should be some sort of common understanding for the sake of the project. He said, "[e]veryone is having their own ideas and we have to bring them onboard and to bring them to common understanding."

3.5 Cooperative working atmosphere

This dimension was the most frequently mentioned one among all of the team identity dimensions. The consultant (#35) asserted that they had a cooperative working atmosphere where they had frequent meetings to discuss and resolve issues and to motivate the team and charge them to work better, he pointed out:

> …we have weekly internal meetings, we generally coordinate the site issues on a day to day basis, but the weekly meetings help us to build the team and of course, we have to motivate the team, and charge them for the personal benefits and better carrier options. These make them on their toes, they work better and try to achieve more.

The design team members explained how they had a cooperative working atmosphere where the different team members helped and supported each other; the senior manager said, “[w]e work together in a professional way. Everyone helps the other when needed.” The MEP engineer concurred with this assessment, “[w]e help each other when needed and we support each other.” The Architect added, “[w]e help each other as a team. Each one of us has a different background and experience so we use that in complementing each other’s work.” The leader (#32) shared the same view, he said, “[w]e all work together as a team. Everyone does his part and they help each other in many times according to their experience and knowledge.”

Individual level

3.7 Self-categorization

There was only one remark made about this dimension reflecting that once a member works for a project for a certain period of time, he becomes part of it. The engineer (#37) said, “We all work on it for a specific period of time, so at that time, we feel that we are part of it, when we pass through it, we feel that its our project.”

3.8 Evaluation

The interviewees did not seem to evaluate their work, only the architect reflected on it and said that the project was not very special, “…I see it as any other project. Some projects are special because you could see how big or different or innovative it is. But this one is not of that type I guess.”

3.9 Importance

The leaders and design team reflected on this dimension. To the project leader (#33), his input in the project seemed to him to be very important and he showed pride in leading it and taking care of every aspect of it, he said, “I work by myself. I am doing paper work, variations, payments, everything, I’m dealing with all contractors on site. And thanks God all of my projects are on time on budget and has good quality.”

For the head of the department, this project is important because it is the first residential project that considers sustainability, he mentioned, “this project is the first residential project in our organization that considers sustainable aspects and it is something that we can be proud of.” The architect also reflected a sense of importance when he said, “…each project is special to me. Do I belong? I guess, because I could see my input to it. When I pass by it, I feel proud that I am part of this project.”

3.10 Attachment and sense of interdependence

This dimension was only mentioned by the design team. The interviewees reflected on this dimension through explaining their feelings about being part of the team and the project, for example the architect said, “When I pass by it, I feel proud that I am part of this project.”

3.11 Social embeddedness

Again, the design team was the only stakeholder who reflected on this dimension, they mentioned some everyday social connections with the team, the MEP engineer said, “[h]e is a good person, we are like friends, I have lunch with him every now and then.” While the architect said, “[s]ome of us are not only colleague but also friends, we grab lunch together, we go out together and so on, and others we only have a professional relationship with."

Following this coding process, the table below is the result of the coding to categorize text into positive, negative and neutral interviewees' remarks about team identity in the JFZ case.

Table 6-51: Stakeholders' remarks about TI -JFZ case

Type of stakeholder	Negative stakeholder integration remarks	Positive stakeholder integration remarks	Neutral stakeholder integration remarks
Consultants	0	1	1
Contractors	0	0	1
Leaders	0	3	0
Design team	1	8	0
Total	1	12	2

Only a few remarks were made about team identity. The table above shows that there were positive, negative and neutral remarks, yet they were mostly positive and were expressed by the design team.

The following table represents examples of significant positive, negative and neutral statements by the different types of stakeholder. The number of the related dimension follows each code.

Table 6-52: Significant remarks about TI, JFZ case

Positive significant statements about team identity	
Consultants	- We have weekly internal meetings, we generally coordinate the site issues on a day to day basis, but the weekly meetings help us to build the team and of course, we have to motivate the team, and charge them for the personal benefits and better carrier options. These make them on their toes, they work better and try to achieve more (3.5)
Leaders	- I work by myself. I am doing my paper work, my variations, my payments, everything. I am dealing with all contractors on site like Hitler! Like a sword! And thanks God all of my projects are on time on budget and has good quality (3.9) - This project is the first residential project in our organization that considers sustainable aspects and it is something that we can be proud of (3.9)
Design team	- We work together in a professional way. Everyone helps the other when needed (3.2, 3.5) - We all work together as a team. Every one does his part and they help each other in many times according to their experience and knowledge (3.5) - My direct manager is not the leader of the project. He gives me some instructions and I follow. He is a good person, we are like friends, I have lunch with him every now and then (3.3, 3.11) - Its good, a couple of my colleagues are my friends so we get along together well. We help each other when needed and we support each other (3.2, 3.5) - we all work on it for a specific period of time, so at that time, we feel that we are part of it, when we pass through it, we feel that its our project (3.1, 3.3, 3.7, 3.10) - I worked closely with the consultant to develop the master plan of the project (3.5) - We help each other as a team. Each one of us has a different background and experience so we use that in complementing each other's work (3.2, 3.5) - Some of us are not only colleague but also friends, we grab lunch together, we go out together and so on, and others we only have a professional relationship with (3.3, 3.11) - I work on a number of projects, each project is special to me, I give it my attention. Do I belong? yes I guess, because I could always see my input to it. When I pass by it, I feel proud that I am part of this project (3.9, 3.10)
- Negative significant statements about team identity	
Design team	- But is it special? I would say not necessary. I see it as any other project. Some projects are special because you could see how big or different or innovative it is. But this one is not of that type I guess (3.8)
- Neutral significant statements about team identity	
Contractors	- Approximately 20 subcontractors are working now. And each one of the subcontractors have their own specifications, all kinds of regulations, following the concept specifications, they have their own specifications as well. So all subcontractors are players as well. And finally they have to comply and adopt according to our design and the concept specifications (3.1, 3.5)
Consultants	- Everyone is having their own ideas and we have to bring them onboard and to bring them to common understanding (3.4)

As shown in the table above, there were a variety of positive remarks expressed related to the different dimensions of team identity. Yet, there was only one negative remark regarding the evaluation of the project. Other neutral remarks covered aspects related to boundary clarity, cooperative working atmosphere, and common language and understanding.

It is worthwhile to note here that many interviewees did not really comment that directly on issues of team identity and they steered the conversation towards other directions. The design team was the only stakeholder group that reflected on it and they were mainly reflecting on the design team itself not the innovation team, which includes the leaders, consultants and contractors. Therefore, an obvious lack of a sense of an innovation team identity was present and the data shown here is a reflection on a small part of the team, which is the design team and not the major innovation team. This can be clearly noted in table (1-8).

6.5.4.4 Category 4: Innovation effectiveness (IE)

To revise and approve the dimensions of the category, the following chart illustrates the number of coding references in each dimension.

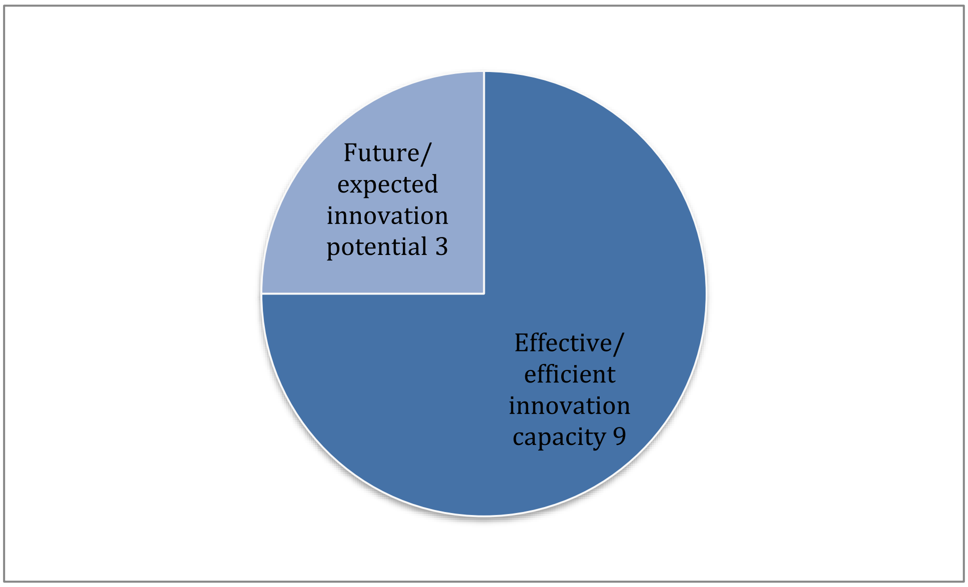


Figure 6-27: Number of coding references of IE dimensions- JFZ case

It is clear from inspecting the chart above that the interviewees mainly measured innovation effectiveness through the effectiveness and efficiency of innovation capacity and rarely according to future expected innovation potential.

The conversation with the interviewees produced 12 passages related to innovation effectiveness. The differences in responses according to the four types of stakeholder are elaborated in Table 6-53.

Table 6-53: Dimension profile- IE- JFZ case

	Consultants	Contractors	Leaders	Design team	Total
4.1 Effective/ efficient innovation capacity	1	2	3	3	**9**
4.2 Future/expected innovation potential	0	0	1	2	**2**
Total	1	2	4	5	**12**

4.1 Effective/ efficient innovation capacity

The different stakeholder groups gave their remarks about the effective/efficient innovation capacity repeatedly. Since the project was still under construction at the time of gathering data, they reflected on the ongoing achievement of their goals. All of them agreed that the product used is achieving its goal in terms of cutting cost, time and labour. The leaders confirmed that the project was meeting the budget so far, and the VP of engineering said, "[i]t is under construction now, the 3D panels are implemented and doing very well. The project as a whole is meeting the budget so far, lets hope it wont have any delays." While the project manager declared, "[a]bsolutely, 100%, and its saving me 30% of the conventional close."

The design team agreed with the leaders in the fact that the project is meeting its expected capacity, the MEP engineer commented, “[i]n terms of meeting the budget and the time frame, it is. The 3D paneling is also working very well and it actually reduced the time and cost as claimed by the contractor.” The consultant shared the same idea, he said:

> [s]o far it is, yes. It saved a lot of manpower, effort, time and cost. I would like to see it years after the implementation to have a better judgment but as far as we know from other projects, it is a successful product.

The contractor confirmed the effectiveness of the 3D panel and said, “[y]es of course, we have implemented many pieces and they are working perfectly, and they saved a lot of time, effort and cost.”

4.2 Future/ expected innovation potential

The interviewees seldom mentioned the future expected innovation goal in their conversations and when they mentioned it they were negative about the sustainability aspect. For example, the project manager (#33) said, “[t]he conventional way is more solid and rigid. It provides more solidity and rigidity. But why do I need that, anyway it’s an indoor section.” While the senior engineer (#31) said, “[i]n terms of the project as a whole, it would have been much better if we weren’t very rushed to finish and if there were less politics involved.”

After this coding process, the table below shows the positive, negative and neutral interviewees’ remarks about innovation effectiveness in Case 3.

Table 6-54: Stakeholders' remarks about IE- JFZ case

Type of stakeholder	Negative innovation effectiveness remarks	Positive innovation effectiveness remarks	Neutral innovation effectiveness remarks
Consultants	0	1	0
Contractors	0	2	0
Leaders	1	3	0
Design team	1	3	0
Total	2	9	0

The table above indicates that there are positive and negative remarks about the effectiveness of innovation. The positive remarks are dominant (9 codes) given by the different types of stakeholder groups. The following table represents examples of significant positive and negative statements by the different types of stakeholders. The number of the related dimension follows each statement.

Table 6-55: Significant statements about IE- JFZ case

Positive significant statements about innovation effectiveness	
Consultants	- So far it is, yes. It saved a lot of manpower, effort, time and cost. I would like to see it years after the implementation to have a better judgment but as far as we know from other projects, it is a successful product (4.1).
Contractors	- Yes of course, we have implemented many pieces and they are working perfectly, and they saved a lot of time, effort and cost (4.1). - It is actually a successful project (4.1).
Leaders	- It is under construction now, the 3D panels are implemented and doing very well. The project as a whole is meeting the budget so far, let's hope it won't have any delays (4.1). - Absolutely, 100%, and its saving me 30% of the conventional close 14 program (4.1). - It is already implemented in some of the sections of the building; it indeed saved money and time but the environmental aspect is still yet to be reflected on (4.1).
Design team	- In terms of construction, it is happening and some of the 3D paneling are implemented and in an excellent condition (4.1). - In terms of meeting the budget and the time frame, it is. The 3D paneling is also working very well and it actually reduced the time and cost as claimed by the contractor (4.1). - Yeah. It is. It is already cutting cost and meeting timeframe. It looks that it is working well. I hope it achieves it environmental and social targets as well. We need some more time to realize that (4.1).
- Negative significant statements about innovation effectiveness	
Leaders	- The conventional way is more solid and rigid. It provides more solidity and rigidity. But why do I need that, anyway it's an indoor section (4.2)
Design team	- In terms of the project as a whole, it would have been much better if we weren't very rushed to finish and if there were less politics involved (4.2) - But it would have differed in terms of sustainability and innovation. We would have more courage and well to discuss ideas with him (4.2)

As shown in the table above, positive remarks were dominant when discussing effective/efficient innovation capacity while they were negative about the future/expected innovation potential. The responses from the interviewees were mainly about implementing the product successfully while meeting the time and budget goals. Overall, the different interviewees did not reflect much on the success of the sustainability aspect of the product or the future expected potential, and they actually mentioned that they thought the conventional product was more solid and rigid. They also complained that the team was not given enough time and freedom to add to the sustainability aspect of the project.

6.5.5 Case3 (JFZ case) summary

The JFZ case was different from the other two cases in that it used a product as an innovation to achieve sustainability in their project. Although the product was not an innovation outside the boundaries of the organization, it was an innovation within the organization as it was used for the first time in executing their construction projects. The open innovation context was proven, as the product was the result of outsourcing and employee involvement. The perception about the different study categories varied from being positive, negative and neutral, yet, the dominant ones were positive.

Stakeholder integration is the most frequently mentioned category among all of the other categories, followed by leadership for innovation. Both have obvious positive, negative and neutral remarks associated with them.

The major negative remarks related to aspects of stakeholder integration and leadership for innovation. The table below summarizes stakeholders' perceptions about each category.

Table 6-56: Stakeholders' perceptions about the conceptual model categories (+ for positive, - for negative)

Type of stakeholder	Leadership for innovation	Stakeholder integration	Team identity	Innovation effectiveness
Consultants	+	+	+	+
Contractors	n/a	+, -	n/a	+
Leaders	+, -	+, -	+	+, -
Design team	+, -	+, -	+, -	+, -

Table 6-57 illustrates that the most discussed dimension was stakeholder interactions and the least mentioned one was self-categorization.

Table 6-57: The perception of the different categories and their dimensions- JFZ case

Conceptual thematic framework	Number of coding references	Perception
1. Leadership for innovation		
1.1 Encouraging and stimulating innovation	11	+, -
1.2 Providing and inspiring vision	0	0
1.3 Individualized support	7	+, -
1.4 Teamwork development	3	+
1.5 Stakeholder integration	7	+, -
2. Stakeholder integration		
2.1 Knowledge of stakeholders	22	+, -
2.2 Stakeholders interactions	34	+, -
2.3 Behaviours adaptation	16	+, -
3. Team identity		
Team level:		
3.1 Boundary clarity	2	+
3.2 Boundary permeability	3	+
3.3 Cohesion	3	+
3.4 Common language and understanding	1	+
3.5 Cooperative working atmosphere	7	+
3.6 Cognitive similarity	0	0
Individual level:		
3.7 Self-categorization	1	+
3.8 Evaluation	1	-
3.9 Importance	3	+
3.10 Attachment and sense of interdependence	2	+
3.11 Social embeddedness	2	+
3.12 Behavioural involvement	0	0
3.13 Content and meaning	0	0
4. Innovation effectiveness		
4.1 Effective/efficient innovation capacity	9	+
4.2 Future/expected innovation potential	3	-

On leadership for innovation, the JFZ case had a number of leadership levels and each level interfered in decision making which introduced an element of inconsistency. Each leadership level tried to impose their own opinions that were influenced by the organizational politics. This restrained the team from creativity and innovation and created a sense of segregation between the team members and the leader, which resulted in poor team engagement especially in decision-making.

With reference to stakeholder integration, the JFZ case had many difficulties with coordinating and stimulating communication between the different stakeholders. The case reveals a number of problems between the contractor and the sub-contractors due to poor communication. There was a lack of trust and evident tension between the different stakeholders. Many interviewees attributed these problems to corruption, revenue driven decision-making, lack of integration of the innovation team members and adopting a routine construction process that discourages communication.

In terms of team identity, the interviewees did not openly express or comment directly on the issue. The design team preferred to reflect on themselves instead of the innovation team as a whole, therefore, there was an obvious lack of a sense of an innovation team identity. Finally, the team preferred to reflect on innovation effectiveness through the effectiveness and efficiency of innovation capacity and rarely drew attention to the future expected innovation potential. They mentioned that they were able to implement the product successfully while meeting the time and budget goals. Overall, they did not reflect much on the success of the sustainability aspect of the product or the future expected potential. They thought that the project would be more effective in terms of sustainable innovations if they were given a sufficient amount of time and freedom to do that.

6.6 Rising Themes

This section identifies some rising themes that are related to the specific research questions. The inductive category formation discussed in section (6.2.2) is used in this section. Hence, not all material is considered for analysis and the step of building paraphrases is skipped. The research question that this section aims to support is how can leadership for innovation, stakeholder integration and team identity influence the innovation effectiveness of sustainable projects.

After the rigorous deductive coding process that was performed in the previous sections, some concepts that are related to the main categories of this research arose; however, they did not fit in the theoretically synthesized dimensions. Therefore, they were highlighted and classified under a common concept; these concepts were later developed into a category or a dimension that is related to the main categories of this research.

6.6.1 Theme 1: Interest in innovation

In the SC case, the different participants mentioned statements that reflect their passion towards the innovation. For example, the contractor (#10) said:

> [m]ost of us have passion for sustainability, maybe because we are working in a sustainable city. And it didn't happen before, even for me. We talked about green buildings and green codes but we have never seen it presented as here, really. So I think the staff want to a have the credit of being involved in sustainability.

The design manager (#11) reflected that he has personal interest in the innovation, he said, "I have a very personal interest in sustainability and I have great personal interest in urban food production, and so I have several passions that are tied together within this project." He added that there are some stakeholders that are very interested in the project without considering the financial aspect of it, he mentioned:

> …but then you have someone like the Emirates Environmental Group which has absolutely no financial vested interest in this but wants to be a stakeholder in the project because they want to see us succeed and they want to see a change within the UAE.

The supplier showed that he is interested in the project because of the well-known name of the project:

> [y]ou can see how they talk about them in the news and the internet; there is some big talking about this project in the UAE. For this reason we take it and the name of the project is good for our requalification in the future.

The consultant (#16) stated that he did not work for this project for financial reasons only, he mentioned that it is an important project and he is proud to be part of it, "his target wasn't financially for both of us. Sure, the financial issue is part of the business but its not the only reason to build the city." He added, "I think this is the future, and when you enter the future by working on the first sustainable city in Dubai, it is something to be proud of."

The leader (#1) stated that authorities and private companies were interested in the idea of the project because of some mutual benefits, "government departments or the companies were very much interested in this initiative because this is a future business for them." He added, "[w]e are interested to get their products and best price. They are interested to sponsor our project or to give us best price for their future business. This is regarding private companies."

There were 33 remarks by the different stakeholders that reflected concepts such as passion, interest, benefit, and pride in innovation.

In the AKO case, participants reflected that it is important to have passion towards sustainability to enhance innovation, however, they were negative about the stakeholders' interest in sustainability in their project and according to them, this did not facilitate innovation in the project. For instance, the leader (#17) said that the owners of the project were not very interested in sustainability although he was, but he could only persuade them whenever his ideas were financially viable, he mentioned, "[o]f course, it does help a lot to have someone who has passion to environment and sustainability." He added:

> I haven't seen so far a single investor that has a clue about sustainability in Dubai. I'm sorry to say that, but I haven't seen a single owner that wants to build a sustainable project for the sake of sustainability. Most of them, they want to do it like a source of income, like profit is their business model.

He continued, "[i]f the owner wants to be involved in sustainable solutions, that would help definitely the project."

The design team mentioned that their main drive was to please the owner of the project and did not reflect any interest in sustainable innovations, they said, "but our main objective-- we actually started the design, the layout, to make sure that we were happy and it met the objectives of our chairman." The contractor showed interest in the project but did not reflect on the sustainable innovation aspect of it, he said, "[w]e are building a city inside a city, it is nice to be part of this city. It is nice to be part of the city that will serve thousands for many generations."

In the JFZ case, there were 12 statements that reflected interest in the sustainable product they used in their project. The design team mentioned the benefits of the product and reflected on their interest in it, the senior engineer said:

> …so when this contractor came into the picture he came with an extra offer, I have 3D paneling and I will deliver before the due date. So this was attractive to the developer because he gave us good price and a shorter time which means the client will rent earlier and will make more money.

It was obvious that their major interest in the product was the financial benefit associated with it, the participants kept associating the financial benefit with the product, the architect (#38) was very honest and said:

> [t]hey want the project to finish as fast as possible to have the financial benefits as soon as possible. And believe me, if this product would have cost more, they wouldn't go for it. Politics and money are major players here between me and you.

The leader on the other hand added another drive to their interest in the innovation, which is the shift towards sustainable construction in the city, he mentioned:

> Dubai in general is going through a change in the construction sector, they are moving towards making their projects greener and more sustainable. So we looked at some items that can be more sustainable and cost efficient at the same time through doing some research.

The consultant also reflected that the developer was considering the trends in city, he mentioned:

> [t]here is an authority requirement, EHS requirement, and the client is also having more effort and initiative in this, for example in the conventional design, the conventional lighting is required but we are using LED lighting because of JFZs interest to produce a more sustainable building. It is not an authority requirement.

All of these statements guided the identification of concepts that lead to the development of a new category, which is 'interest in innovation.'

Table 6-58: Category formation (Theme 2)

Inductive category formation template			
	SC	**AKO**	**JFZ**
	- Passion towards sustainability. - Personal interest in sustainability. - Interest in project for mutual benefits	- Lack of interest in sustainability hinders innovation. - Owner's interest influences innovation	- Financially driven interest in innovation. - Interest in innovation to follow city trends
Category	**Interest in innovation**		
Properties	- Personal stakeholders' interest in innovation - Project owner's interest in innovation - Different drivers to innovate		

As noticed from the analysis, this category influences the overall effectiveness of the innovation and this will be addressed in the model in the following chapter.

6.6.2 Theme 2: Selective hiring

In the SC case, the different participants stressed the importance of choosing the right team members that could facilitate innovation in the project. The leader (#1) was very selective in hiring the right team members, he said:

> [w]e hired 2 international consultants to develop the initial plan with us but we weren't very impressed by their work so I hired a couple of architects and engineers, most of them where freshmen from local universities, and they produced a very good initial plan.

He added, "[w]e hired new people based on that and based on their knowledge about the subject." His partner agreed with him and said, "[s]electing the specialists and the people at the right position, this is the most important thing."

The design team agreed with that fact and mentioned that the leader was very selective in hiring team members and stakeholders and made sure that their vision was in line with the project's vision. A design manager (#3) said, "Mr. F hired us; we are all quite young, but that's because he believes in young minds. He believes that young people and fresh mind are more liberal thinkers than older people.” The design manager on site also mentioned the benefit of selectively hiring team members, he said, “how to get there from a commercial standpoint? putting together the right team members and It’s been interesting, we've had lots of young, vibrant, new ideas coming through which has been really important.” He also mentioned that the combination of youthful minds and expertise was very useful for the project:

> [w]e've had great support from various consultants that we brought on board that we've worked with in the past and that we trust. So I think it's been a good combination of youthful ideas and experienced technical team.

The consultant agreed with that and said, “…and the team chosen by the developer to manage the project was very good, and the contractor has good intentions to finish the project.”

In the AKO case, participants mentioned the importance of selecting the right stakeholders. The design team reflected on selecting the right contractors, they said, “so the most important thing is to prequalify the contractors, basically, based on the nature of the project.” However, after that they mentioned that some financial aspect influenced their hiring strategy, they said:

> [w]e wanted to get good prices and big, top notch contractors. Then we realized that we are not getting good prices from big contractors. So we started splitting the packages. Instead of having one big package of, let's say, 500 million for infrastructure, we will divide it into 3 or 4 different packages. And then we selected medium class cheaper contractors.

In the JFZ case, they selectively hired the contractor that offered the sustainable product. The VP of engineering (#32) said, “[i]n addition to that when we wanted to assign a contractor, we looked at their proposals and we picked the one that offered us more sustainable solutions.” Then, the head of engineering department supported his statement and said, “[w]e were also looking for more sustainable materials especially while tendering. A contractor that proposed a 3D paneling technique for the indoor walls grabbed our attention and we made a deal with him.”

It is evident that the SC leader was very selective in hiring the team and stakeholders who were in favour of the sustainable innovation and mentioned that it was highly influential on innovation in the project. In contrast, the AKO leader did not pay good attention to this aspect and let the financial aspects interfere. The JFZ had a good opportunity to select the right contractor for the sake of their innovative product, however, the leader did not pay attention to this aspect when it came to the other team members and stakeholders which caused some stakeholder conflicts.

From this analysis, it was obvious that ‘selective hiring’ plays a role in facilitating innovation. Since the leader normally facilitates hiring, it was considered as a dimension to be added to leadership for innovation.

Table 6-59: Category formation (Theme2)

Inductive category formation template			
	SC	**AKO**	**JFZ**
	- Hiring people with shared vision and interests. - Combination of fresh minds and expertise.	- Hiring the right stakeholders. - Financial aspect is dominant	- Hiring specific stakeholder for the benefit of the project
Dimension	**Selective hiring**		
Properties	- Hiring team members and stakeholder that share the project’s vision and interest - Hiring right people for the right position to support the innovation Financial aspects interfere in hiring.		

The inductive category formation process resulted in the realization of a new category and an additional dimension to leadership for innovation. These two aspects were repeatedly mentioned in the three cases and were found related to the categories of our conceptual model, hence, they could not be ignored.

6.7 Cross case analysis and case study summary

This section provides a descriptive cross-case analysis to facilitate the comparison of commonalities and difference between the units of analyses in our three case studies. The table below represents a summary of the context of each case, a summary of the analysed data that is related to each study category namely, leadership for innovation, stakeholder integration, team identity, and innovation effectiveness.

Table 6-60: SC case summary

Case title	Context	Leadership for innovation	Stakeholder integration	Team identity	Innovation effectiveness
Case 1 SC	- The overall project was perceived as a sustainable innovation. - The project mainly used outsourcing R&D and external networking and customer involvement as means of open innovation - There was a strong interest in sustainability among all stakeholders.	The leader was strong in: - Providing and inspiring vision. - Encouraging and stimulating innovation. - Provides an individualized support. - Teamwork development. - Stakeholder integration. - Selective hiring No negative remarks were attributed to him.	The project was strong at: - Facilitating stakeholder interactions. - Knowledge of stakeholders. - Behaviours adaptation. Negative aspects were attributed to the following: - The miscommunication between the different stakeholders. - The disqualification of the opinions of some stakeholders. - The negativity and disapprovals of some stakeholders. - The slow responses and routine work from some stakeholders. - The slow adaptation to learn and keep up with the project.	The team showed stronger identity at a team level than the individual level. Strong identity at a team level in: - Cooperative working atmosphere. - Cohesion - Boundary permeability - Common language and understanding. Good identity at a team level in: - Cognitive similarity - Boundary clarity Good identity at an individual level in: - Attachment - Importance - Self-categorization - Content and meaning Poor: - Social embeddedness - Behavioural involvement - Evaluation The major negative aspects were: - The language and cultural barriers. - Differences in nationalities and work ethics - Lack of interest in innovation by some stakeholders.	The innovation was effective in terms of: - Future/ expected innovation potential - Effective/ efficient innovation capacity No negative remarks were attributed to the effectiveness of the innovation

Table 6-61: AKO case summary

Case title	Context	Leadership for innovation	Stakeholder integration	Team identity	Innovation effectiveness
Case 2 AKO	- The overall project was perceived as a sustainable innovation. - The project mainly used outsourcing R&D and external networking as a means of open innovation. - There was a weak interest in sustainability among stakeholders.	The leader was strong in: - Teamwork development. - Encouraging and stimulating innovation The leader was good at: - Individualized support - Stakeholder integration. The leader should improve in: - Giving incentives. - Sharing information and communicating with the different stakeholders. - The knowledge of how to deal with stakeholders. - Leaders being role models to their employees. - Selective hiring	The project was good at: - Knowledge of stakeholders. - Facilitating stakeholder interactions. - Behaviours adaptation Negative aspects were attributed to the following: - The miscommunication between the different stakeholders. - The ignorance of some stakeholders in regards to the innovation. - The late integration of some stakeholders. - The slow responses and routine work from some stakeholders. - The change of scope, requirements, and designs without early notice. - The inability to adapt to some stakeholders' behaviours.	The team showed good identity in aspects related to identity at a team level and individual level. The team showed good identity at a team level in: - Cooperative working atmosphere. - Cohesion The team showed good identity at an individual level in: - Attachment and sense of interdependence - Importance - Behavioural involvement The team had poor: - Self-categorization - Evaluation - Social embeddedness - Cognitive similarity - Boundary clarity - Content and meaning The major negative aspects were attributed to: - The language and cultural barriers. - Ignorance about the innovation. - The miscommunication and the misunderstandings among the team members.	The innovation was effective in terms of: - Effective/ efficient innovation capacity And less effective in terms of: - Future/ expected innovation potential The major negative aspects were attributed to: - The enforcement of many green regulations that can stress the team and kill innovation. - The unwillingness of some stakeholders to take risks that are usually associated with innovations. - The unwillingness of some stakeholders to invest in innovations. - The dissatisfaction of some team members with their partners.

Table 6-62: JFZ case summary

Case title	Context	Leadership for innovation	Stakeholder integration	Team identity	Innovation effectiveness
Case 3 JFZ	- The project used a sustainable product for the first time in their organization (innovation within organizational boundaries). - The project used employee involvement, inward IP licensing and external participation and outsourcing R&D and external participation as means of open innovation. - Stakeholders varied in their interest in sustainability.	The leader was good at: - Stakeholder integration. - Individualized support The leader was weak at: - Teamwork development - Encouraging and stimulating innovation - Providing and inspiring vision The major negative aspects were attributed to: - Many levels of leadership and hierarchy - Organizational politics - The segregation between leaders and the team - Poor team engagement especially in decision-making and innovation	The project was good at: - Behaviours adaptation. - Knowledge of stakeholders. Negative aspects were attributed to the following: - Lack of coordination between the contractor and the sub-contractors. - Poor communication from the sub-contractor's side. - Lack of trust between the client, the contractor and the consultant. - Corruption. - The routine construction process that discourage communication. - The replacement of a known and trusted stakeholder with a new one for financial reasons. - Revenue driven decisions from the leaders. - The lack of integration of the design team in the decision making process.	The team showed good identity in aspects related to identity at a team level and poor identity at an individual level. The team showed good identity at a team level in: - Cooperative working atmosphere. - Cohesion - Boundary permeability The team had poor: - Self-categorization - Evaluation - Cognitive similarity - Content and meaning - Behavioural involvement - Common language and understanding The major negative aspects were attributed to: - Obvious lack of a sense of an innovation team identity.	The innovation was effective in terms of: - Effective/ efficient innovation capacity And not effective in terms of: - Future/ expected innovation potential

It is clear from the descriptive cross case analysis that the context of each case is based on open sources of innovation, however, they differ in the method used to achieve that. The SC interviewees frequently mentioned their dependability on open sources of innovation to produce a state of the art innovation in their project. The leader was very aware of the concept and stressed on its importance. They relied on different means of open innovation but focused on outsourcing R&D and external networking, and customer involvement. The AKO project interviewees on the other hand, were not very aware of the benefit of open innovation; they mainly relied on outsourcing R&D and external networking, and partnerships out of necessity or as a mean for marketing. The JFZ relied on employee involvement, inward IP licensing and external participation, and outsourcing R&D and external participation as means of open innovation, however, all of these means were minor and very controlled by the politics of the organization and were chiefly revenue driven.

The SC leader represented all of the qualities of leadership for innovation. He was very selective in hiring the right and interested team; he developed a strong and innovative team; he had the necessary skills to integrate stakeholders; he encouraged and stimulated innovation and provided individualized support to the innovation team, and most importantly he provided the team with a vision and inspired them. All of the stakeholder groups, excluding the supplier, reflected positively about him and considered him as an idol and an inspiration. The AKO leader, however, lacked a vision; therefore, he could not inspire a vision or present himself as a role model to the team. Moreover, he wasn’t selective in hiring the innovation team; therefore, some team members were obviously lacking interest in innovation. Nevertheless, he worked on encouraging the team to innovate and provided them with individualized support and encouraged teamwork. He faced some challenges in integrating stakeholders due to some cultural and language barriers, but he could work out ways to understand them and know their needs and demands and deal with them accordingly. The different stakeholder groups excluding the supplier confirmed his competence as a leader for innovation but they also pointed out ways to progress such as improving his knowledge on how to deal with stakeholders and enhance communication among them. The JFZ had multiple levels of leadership and there was no clear definition of who the leader of the project was. Every one of the proclaimed leaders had a different view of the innovation and there was no obvious agreement amongst them. This multiplicity of leadership levels and interests affected the project team negatively since there was an obvious lack in providing and inspiring a vision, encouraging and stimulating innovation as well as team development and integration. This is further reflected in the responses from the different stakeholder groups where the contractor preferred not to comment about leadership, the design team mentioned negative and positive remarks almost equally, and the leaders themselves had some negative views about the leadership of their project.

Stakeholders were successfully integrated in the SC case, interaction was the primary mean of stakeholder integration that was supported by the knowledge of stakeholders and adaptation behaviour. The different stakeholder groups repeatedly mentioned the influence that stakeholder integration had on the overall success of the project. They also mentioned how their leader paid special attention to this aspect and encouraged it within the innovation team. The consultant, contractor and design team pointed out some minor challenges they faced to integrate stakeholders, which is mainly related to miscommunication, the disqualification and negativity of some stakeholders, and the slow response from authorities, but they all developed techniques to handle these issues and adapt to them. Similarly, the AKO case focused on stakeholder interaction as a mean to integrate stakeholders, however, there were many negative remarks about this dimension. The communication between the major stakeholders (developer-contractor, consultant-contractor) was poor, which caused a series of challenges and problems especially when the developer and consultant changed scope or design without giving early notice. The late integration of some stakeholders also added to the problem along with some other issues such as the slow response from authorities, authorities' requirements for continuous changes, the ignorance of some stakeholders about innovation, and the inability to adapt to stakeholders' behaviours. They seldom adapted to these challenges or developed techniques to handle them, sometimes one small challenge led to a bigger problem due to poor management. The JFZ case was very different when it came to having strong experience with stakeholders, especially authorities. Their knowledge of stakeholders was good but they were poor in facilitating interaction among them, which resulted in an obvious miscommunication between the contractor and sub-contractor, a lack of trust between the developer, consultant, and contractor and poor integration of the design team in the decision making process. In addition to that, the developer was financially driven substituting a consultant that they had relevant experience with another one that cost less and this frustrated the design team.

The team in the SC case developed a strong team and individual level identity; nevertheless, they had stronger overall team identity in comparison to individual identity. They attributed their team identity to the cooperative working atmosphere in the project that stimulates cooperation and communication. They also shared a common language and understanding of the innovation, which stimulated cohesion. Boundary clarity and permeability, and cognitive similarity were good in the SC case, too. At the individual level, they showed a strong sense of attachment and interdependence; they also could clearly categorize themselves into a specific group and felt that what they do is important. The main challenges that the team faced was the language and cultural barriers due to differences in nationalities and work ethics among stakeholders and the lack of interest in innovation by some stakeholders. In the AKO case, the cooperative working atmosphere and cohesion stimulated the sense of identity in the team. Boundaries were not very clear and there was greater permeability and cognitive similarity. The team faced some challenges due to language and cultural barriers and the ignorance about the innovation among the team members. At an individual level, the team revealed attachment and a sense of interdependence, behavioural involvement and importance. However, they did not display feelings of content and meaning or loyalty and pride and they did not show social embeddeness or self-categorization. Similarly, the JFZ case team did not reflect much on their individual identity and they were lacking many aspects related to it such as the sense of content and meaning, behavioural involvement, self-categorization, and evaluation. At a team level, the cooperative working atmosphere, cohesion and boundary permeability enhanced the sense of identity but it was not very strong. In general, there was an obvious lack of a sense of an innovation team identity in the JFZ case

In terms of the innovation, since the projects were still under construction, the future/expected innovation potential and effective/efficient innovation capacity were analyzed to study innovation effectiveness. In the SC case, both dimensions were exceeding the expectations and all stakeholder groups reflected positively about meeting their capacity so far and were very positive about the future expected potential. According to news articles the project was meeting all of its expected goals especially in terms of sustainability and was becoming a global example and benchmark for sustainable innovations. It was presented in many global sustainability summits, conferences and events and taught as a case study in many schools and universities. In distinction, the AKO case faced some obstacles when it came to the future expected innovation potential. A number of news articles criticized AKO in terms of sustainability as they claimed that they used sustainability for marketing purposes and that their proclaimed sustainable innovations are weak and can be debatable. The team itself was also not very positive about the effectiveness of the sustainable innovations in their project, and they pointed out that the enforcement of many green regulations stressed the team and killed innovation. They also mentioned that some major stakeholders were unwilling to take risks that could be associated with innovation. It was apparent that the team were not very satisfied about working with the partners of the project. In the JFZ case, the team preferred to reflect on innovation effectiveness through the effectiveness and efficiency of innovation capacity and rarely addressed the future expected innovation potential. To them, the ability to successfully implement the product while meeting the time and budget goals was a reflection of the success of the innovation. They overlooked the measurement of the success of the product in terms of sustainability. It was clearly noticeable that their interest in sustainability was not a major driver for the implementation of the product, but rather an image that they wanted to reflect to the government. The design team thought that there could have been more potential to develop sustainable measures and solutions if they were given sufficient time and freedom to do it.

6.8 Major correlations

The analysis identified a network of relationships between the categories. However, since the relevant correlations will be discussed in the next chapter, this section will present only a brief overview of the major correlations. It was evident from the three cases that stakeholder integration is highly influenced by leadership for innovation. When the remarks about leadership were significantly positive as indicated in the SC case, stakeholder integration was positive as well. On the contrary, when the remarks about leadership varied between being positive and negative, stakeholder integration was challenged, as indicated in the AKO and the JFZ case. Consequently, team identity was influenced as well; positive leadership and stakeholder integration led to a strong sense of team identity while the challenged leadership and integration led to a weak sense of team identity. These aspects collectively influence the overall effectiveness of the innovation. The analysis also revealed a new external category that had an influence on the different stakeholders, which is interest in innovation. When leaders, stakeholders and the innovation team were interested in the innovation as in the SC case, the overall relationship between the different categories was positive and this led to effective innovation.

6.9 Chapter summary

This chapter provided the interpretation and analysis of the three case studies and summarized the findings, which were the result of a systematic and rigorous data collection, coding, analysis and synthesis. Evidence and the execution of the data analysis for all of the findings have been transparently presented. This was further enhanced with examples of the verbatim data and the synthesis and interpretation of the data. The open innovation context in all three cases was examined and assessed, and then an analysis of the different categories in the research conceptual model was performed. The different dimensions of the derived categories namely, leadership for innovation, stakeholder integration, team identity and innovation effectiveness were analyzed and categorized (into positive, negative and neutral) according to the perception about them. This analysis aided in revealing the main correlations between the categories and their dimensions and enabled the researcher to reach an understanding of how stakeholder integration is influenced in an open innovation construction project and subsequently how it influences innovation effectiveness. The findings suggest that stakeholder integration is highly influenced by leadership for innovation which, in turn, affects the identity of the innovation team and vice versa. The relationship between these aspects has a direct effect on innovation effectiveness. Furthermore, a new external category was realized in the process which is ‘interest in innovation’, this category arose several times in conversations with stakeholders, it led to the awareness of its importance and its significant influence on the innovation. The dimensions of each category were also analyzed in the process, their significance and correlation with the categories is further discussed in the following chapter.

Chapter 7- Model Evaluation and Discussion

Introduction to Chapter

The aim of this chapter is to discuss the outcome of the undertaken research to confirm the relationships between the categories in the developed conceptual model and to enable projects and organizations improve the effectiveness of their innovations. Section 7.1 briefly explains the rationale for developing the conceptual model followed by Section 7.2 that provides the purpose and details of the model evaluation process as well as explaining and justifying the relevant analysis approaches. Section 7.3 describes the analytical techniques used for the analysis of within-case data and the evaluation of cross-case patterns. The findings of the within-case and cross-case analyses are presented in Sections 7.4 and 7.5, respectively. In Section 7.6, the pertinent findings of the analysis are reviewed and a discussion of the overall findings of the research is provided. This is followed by section 7.7, which summarises the chapter.

7.1 The rationale for developing the conceptual model

The construction industry currently is under massive pressure to reduce its impact on the environment and innovate to achieve more sustainable projects. In Chapter 1, it was illustrated that the complex nature of construction projects requires a high level of coordination and integration among a large number of internal and external stakeholders to achieve sound innovations. Consequently, open innovation has been widely recognized in construction as it fosters cross-boundary collaboration and knowledge sharing between the different stakeholders to achieve innovation goals

(Chesbrough 2003). A well-managed stakeholder integration framework nurtures the collaboration between the different stakeholders to achieve effective innovations in projects. Researchers have realized this need and worked on studying the different aspects that influence innovation adoption, diffusion and implementation capability at a firm level, however, as evident in Chapter 2, little attention has been paid to project level studies and the few of them that address innovation at the project level are sufficiently general in application and there is an evident lack of research on the influence of stakeholders on the effectiveness of open innovation in construction projects. This was the motivation to understand the different mechanisms to integrate stakeholders throughout the project lifecycle and develop a model that enhances stakeholder integration in an open innovation construction project context.

Chapter 2 elaborates on the relationship between integration and leadership. Research has presented evidence that leadership style has a significant influence on innovation (Howell & Shea 2001). Their influence on the team and their ability to facilitate the development of an identity among the innovation team members has been discussed in some studies as well (Rese & Baier 2012). However, the link between the role of leaders in facilitating effective stakeholder integration and innovation team identity in an open innovation context and its influence on innovation effectiveness is currently lacking in the research literature, especially in the context of construction projects. On the basis of these factors and the aim of developing a conceptual model to support construction projects in their achievement of effective innovations, key research study objectives have been established. These are:

- To facilitate a holistic view of the current state of sustainable innovation in construction projects based in Dubai, which uncovers strengths and weaknesses and raises awareness of the areas of concern.

- To establish a framework that offers practical contributions for the management of innovation within the construction context.

- To guide projects in assessing the current state of their innovation and instruct them about the major factors that need attention.

The conceptual model that was developed in chapter three addresses the above key objectives through linking the empirical evidence discussed in Chapter 6 and the literature discussed in Chapters 2 and 3. The development of the model and its evaluation is elaborated in the next section.

7.2 Model evaluation overview

The aim of the model evaluation phase was to determine whether the categories, derived from the synthesis of the literature in Chapter 3, could be generalized to the actual phenomena, taking into account the significance of people and the reality of the context under investigation. Corroborating the links between the model constructs was achieved utilising an exploratory case study research approach. By nature, this approach aims to explore the relationship between the model construct and the factors influencing each construct.

To carry out the case studies, each construct was operationalized to be able to formulate a measure to analyse it. As mentioned in Chapter 4, the study employed semi-structured interviews as a method to probe and explore specific variables representing each of the model constructs and dimensions. Essentially, having accurate measures provides a clear framework in which the interview can be systematically and concisely conducted, thus yielding a robust method for collecting valid qualitative data. Since the case studies were employed to validate the model derived from the synthesis of the literature, all measures were developed entirely based on the synthesis conducted in Chapter 3. This was done to confirm that the data gathered from the case studies can be compared to those collected from the relevant literature, hence facilitating a more accurate validation of the model.

7.3 Details of analysis

As described in Chapter 4, the model evaluation involved two key analysis steps: within-case and cross-case analyses. The within-case analysis evaluated the collected data and aided in reporting the findings from each case study. The findings are represented in terms of the participants' remarks given and their relevance to the model dimensions, which are summarised to provide an overall rating for their primary construct. The results from the within-case analysis were then compared and examined to present the cross-case findings that yield the final outcomes as to whether the derived model can be reasonably explained by the case studies. The following sections provide further explain these analysis steps.

7.3.1 Within-case analysis

The within-case analysis began with the data collection for the three case studies, which included 38 interview transcripts, as well as other relevant documentation including observation notes, firms' profiles, and news articles. The case data were analyzed through a directed content analysis method where the researcher used established research and theory to develop the initial coding scheme before beginning to analyze the data (Kyngas & Vanhanen 1999). Then, as the analysis proceeded, additional codes were developed, and the initial coding scheme was revised and refined. An example of the coded interview transcript using NVivo is presented in Appendix 6.

Following the coding process and adopting Mayring's (2014) approach, the analysis proceeded with analysing the frequencies of the codes over all recording units and comparing frequencies in different groups of recording units. The perception about each category and their related dimension was analyzed. This permitted classifying the various attitudes and opinions of the different stakeholders about them to understand how they influenced each type of stakeholder and consequently understand whether this influence had an effect on innovation effectiveness. This was represented using Miles and Huberman's (1989) tabular approach, which involves creating a matrix of categories that represent the model constructs along with their associated evidence. Adopting the tabular approach meant that the table contained only raw evidence, which allowed a clear distinction between the evidence and the interpretation (Yin 2003). Data from each case was interpreted and summarized with a narrative about the major findings, the perceptions of the different stakeholders, and major strengths and weaknesses in each category.

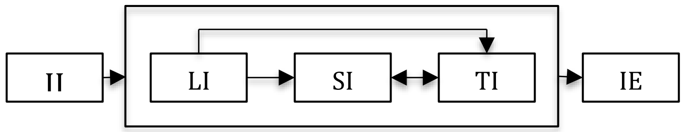
7.3.2 Cross-case analysis

As mentioned in Chapter 4, the aim of the cross-case analysis was to confirm the case studies conclusions. This analysis facilitated the comparison of commonalities and difference between the units of analysis in the three case studies resulting in the development of a narrative of the cases. To further support the discussion of the cases, a 'pattern matching' technique was adopted, whereby a match between the results from the study and the theoretical propositions was evaluated. Theoretically, the technique involves comparing a relationship pattern of actual variables with those predicted by the model.

Based on the conceptual model presented in Chapter 6, the predicted patterns were developed using high, medium and low value descriptors for the exogenous constructs, namely interest in innovation (II) and innovation effectiveness (IE) and their related dimensions, and the endogenous constructs named leadership for innovation (LI), stakeholder integration (SI), and team identity (TI) and their related dimensions. These descriptors were based on the perceptions and remarks given by the interviewees. Positive remarks reflect a 'high' description of the construct, whereas when there is a combination of positive and negative remarks and the positive remarks are dominant, it reflects a 'medium' description of the construct, while when the negative remarks are more dominant, it reflects a 'low' description of the construct. It is worthwhile to note that the dimensions that were not reflected on or had a very low number of codes (less than 20% of the sample size) in one case were compared with the similar ones in the other two cases, if one case had a good number of codes reflecting the dimension, it indicates the viability of the dimension and a decision to keep the dimension was made and a description of 'low' was given. On the other hand, dimensions that have a very low number of codes or no codes at all in all three cases were neglected since they were considered not viable.

Three main predicted patterns were developed, as presented in the following figure. It is worth reiterating that the prediction was only carried out based on the key descriptors (i.e. high, medium and low), and subtle patterns were not postulated since the analysis aimed to provide only a gross match or mismatch between the case-based patterns and the model-predicted patterns. Chapter 4 provides the rationale for adopting such an approach.

Model



Predicted pattern 1	High →	High →	High →	High →	High
Predicted pattern 2	Medium →	Medium →	Medium →	Medium →	Medium
Predicted pattern 3	Low →	Low →	Low →	Low →	Low

Figure 7-1: Predicted patterns of relationships between model constructs

Figure 7-1 illustrates that the model predicted that a higher level of II would lead to a higher level of the endogenous constructs LI, SI and TI. Likewise, higher levels of the collective endogenous constructs will significantly influence the level of IE. Consequently, the higher level of LI will lead to a higher level of SI and TI, which will result in a higher level of IE. In addition to that, a high level of SI will lead to a higher level of TI and vice versa. Correspondingly, a lower level of II will result in a lower level of the endogenous constructs, leading to a lower level of IE. To evaluate the match or mismatch of the case-based results to the predicted patterns, the analysis used the following criteria: (1) if one of the predicted patterns of the model constructs can be completely explained by the actual pattern obtained from a case study, the actual pattern is said to have a 'perfect match' to the predicted pattern; (2) if one of the predicted patterns can be mostly explained by the actual pattern, the actual pattern is said to have a 'good match' to the predicted pattern; (3) if only some part of one of the predicted patterns can be explained by the actual pattern, the actual pattern is said to have a 'partial match' to the predicted pattern; and (4) if none of the predicted patterns seems to be explained by the actual pattern, the actual pattern is considered to have 'no match' to the predicted patterns. This technique is encouraged by Mitchell and Bernauer (1998) since it clarifies the predictions of the model in the cases at hand and demonstrates whether the constructs correlate as predicted.

Based on the extent to which cases matched the predicted pattern, the developed model can be judged as acceptable or not. If the matching results between the case-based patterns and the predicted patterns have a good or perfect match, it means that the model can be qualitatively validated by the case studies. On the other hand, if most of the results display a poor match, the model cannot be validated by the case studies.

7.4 Within-Case analysis findings

Case studies were conducted with Dubai based mix-use construction projects during September 2015 and May 2016. In total, three firms participated in the study. For the purpose of confidentiality, the three case studies are referred to as SC, AKO, and JFZ to maintain their anonymity. The case study profiles of all projects are summarised in Table (7-1). Overall, the case studies comprised a good mix of projects. As Table 7-1 shows, all of the cases are intended to be sustainable residential projects, the sizes of the projects varied, nevertheless, the researcher interviewed people that worked on similar size clusters for each project to represent similar samples. SC and AKO represented the whole project as a sustainable innovation whereas JFZ represented a sustainable product innovation within the boundaries of their organization.

In total, there were 38 leaders, team members and other stakeholders that participated in the interviews. This group of participants consisted of a good combination of stakeholders such as project leaders, design team members, consultants, contractors, suppliers and some other administrative positions to complement the information. All of them also possessed at least a Bachelor's degree relevant to their field of expertise. Therefore, they were considered adequate for this part of the study as they were likely to provide reliable, accurate and insightful accounts relevant to the topics of investigation (Appendix 4). The interview duration with each participant ranged from 20 to 60 minutes, with an average duration of 40 minutes. All of the interviews were conducted by the author of this thesis, on a one-to-one basis.

Table 7-1: Case study profiles

Case	Description	Project size	Innovation type	Interview participants	Interview location
SC	Sustainable mix-use residential project	5M square feet	Project level sustainable innovation	- 2 Leaders - 4 Design team - 2 Consultants - 4 Contractors - 1 Supplier - 3 Other positions	SC head office Onsite location Modular head office
AKO	Sustainable mix-use residential project	55M square feet	Project level sustainable innovation	- 2 Leaders - 5 Design team - 4 Consultants - 2 Contractors - 1 Supplier	AKO head office Onsite location
JFZ	Sustainable residential project	697,210 square feet	Product level sustainable innovation	- 3 Leaders - 3 Design team - 1 Consultant - 1 Contractor	JFZ head office Onsite location

Table (7-2) summarizes the within-case analysis results, in terms of the qualitative rating assigned for each construct and its associated dimensions, for all of the case studies. The table shows a rating of the dimensions derived from the qualitative findings, which were totaled to represent the overall rating for the main four constructs (LI, SI, TI, IE).

Table 7-2: Within case analysis results

Construct/Dimensions	SC Rating	AKO Rating	JFZ Rating
Interest in innovation (II)	**High**	**Low**	**Medium**
Leadership for innovation (LI)	**High**	**High**	**Medium**
1.1 Encouraging and stimulating innovation	High	High	Medium
1.2 Providing and inspiring vision	High	Medium	Low
1.3 Individualized support	High	High	Medium
1.4 Teamwork development	High	High	Medium
1.5 Stakeholder integration	High	Medium	Medium
Stakeholder integration (SI)	**High**	**Medium**	**Medium**
2.1 Knowledge of stakeholders	High	Medium	Medium
2.2 Stakeholders interactions	Medium	Medium	Medium
2.3 Behaviours adaptation	High	Medium	Medium
Team identity (TI)	**High**	**Medium**	**Low**
3.1 Boundary clarity	High	Medium	Low
3.2 Boundary permeability	High	Medium	Low
3.3 Cohesion	Medium	High	High
3.4 Common language and understanding	Medium	Medium	Low
3.5 Cooperative working atmosphere	High	High	High
3.6 Cognitive similarity	Medium	Low	Low
3.7 Self-categorization	High	Low	Low
3.8 Evaluation	High	Low	Low
3.9 Importance	High	High	High
3.10 Attachment and sense of interdependence	High	High	Low
3.11 Social embeddedness	High	Low	Low
3.12 Behavioural involvement	Low	Medium	Low
3.13 Content and meaning	High	Low	Low
Innovation Effectiveness (IE)	**High**	**Medium**	**Medium**
4.1 Effective/efficient innovation capacity	High	Medium	High
4.2 Future/expected innovation potential	High	Medium	Low

7.4.1 Interest in innovation (II) construct rating

Interest in innovation was a rising theme that the researcher could not overlook while conducting the content analysis. The rating level of the II construct was found to be high in in the SC case, low in the AKO case, and medium in the JFZ case. For the SC case a high level of II was demonstrated by the leader's and the innovation team's passion towards sustainability in addition to their personal and individual level interest in sustainability. Likewise, stakeholders in general had an interest in the sustainability aspect of the SC project for some mutual benefits. On the other hand, the AKO case revealed low interest in the sustainability concept itself and a high interest in the financial benefit associated with having the 'green' label attached to their project. Most of the stakeholders and team members have shown low interest and awareness about sustainability and have attributed that to the project owner's low interest in sustainability. The JFZ project revealed that their interest in innovation was derived from the city trends and the pressure from the government. In addition to that, the financial benefit that was associated with their innovation attracted them to invest in it. From the findings, it was apparent that II is derived from personal/individual level stakeholders' interest in innovation, project owner's interest in innovation and the drivers to innovate.

7.4.2 Leadership for innovation (LI) construct rating

The rating level of the LI construct was found to be high in the SC and AKO case, and medium in the JFZ case (Table 7-2). For the SC and the AKO cases, strong leadership was demonstrated by the high rating level in all LI five dimensions with the exception of providing and inspiring vision and stakeholder integration ability in the AKO case that was medium rated. The JFZ leadership on the other hand, was rated medium because three out of five dimensions (encouraging and stimulating innovation, individualized support, and stakeholder integration) were rated medium, while (team work development) was rated high and (providing and inspiring vision) was not reflected on therefore it was considered within the low category. To elaborate on this, the leader of the SC case was very active in promoting innovation and spent much time working alongside his team members and paid a great effort in integrating stakeholders. Similarly, in the case of AKO, although not very successful in inspiring vision and integrating stakeholder, the leader encouraged innovation and strongly emphasised teamwork while providing an individualized support. On the contrary, although the leaders in the JFZ case were good at integrating stakeholders and providing individualized support, the overall leadership behaviour appeared suppressed by a passive style for promoting and stimulating innovation and teamwork development, which resulted in the medium overall rating level of LI.

7.4.3 Stakeholder integration (SI) construct rating

The findings regarding stakeholder integration (SI) show high rating for the SC project and moderate rating for both the AKO and JFZ projects (Table 7-2). The SC project ranked high in knowledge of stakeholders as they were devoting a great amount of time and budget to know stakeholders' characteristics and demands as well as facilitating their previous relationships with stakeholders. Stakeholder interaction was moderately rated as a need for better communication channels was noted. Although there was a medium rated dimension in this case, it was outweighed by the high rating level of the other two, thus, resulting in the overall high rating level of SI in the SC case. The AKO and JFZ cases on the other hand, were less capable of achieving high rated dimensions because their interest in stakeholders was mainly financially driven, they had challenges in facilitating good communication and coordination between the different stakeholders, they were not very interactive with stakeholders and team members in decision making, and they were weak in adapting to stakeholders' behaviours. This resulted in a medium rating for all of the three dimensions of SI and as a result a medium overall rating of the SI construct in both projects.

In addition to the above findings, it is also apparent that the only factor that was consistently rated as medium across all firms is 'stakeholder interaction' which indicates the challenge in achieving this aspect and the need for more effective techniques to achieve it.

7.4.4 Team identity (TI) construct rating

Similar to the above results, the findings concerning team identity (TI) show high identity level in the SC case and moderate identity levels in both the AKO and JFZ cases (Table 7-2). Particularly in the SC case, a high rating level of TI was demonstrated by a high level of boundary clarity and permeability, a cooperative working atmosphere, a successful self-categorization within the innovation team, high level evaluation and the resulted feeling of importance within the team, strong attachment and sense of interdependence, a good overall social embeddedness, and a strong sense of content and meaning. The team reflected a moderate level of cohesion, common language and understanding, and cognitive similarity and a low level of behavioural involvement; however, the overall rating level was outweighed by the high rating levels of the other dimensions. In the AKO case though, the moderate level of boundary clarity and permeability, common language and understanding, and behavioural involvement along with the low level of social embeddeness, self-categorization, evaluation, and content and meaning moderated the overall rating of the construct despite the high rating of the other dimensions. In the JFZ case, although the team had a strong feeling of importance and cohesion and the atmosphere was cooperative, the overall rating of the other dimensions was low which yielded to a low overall rating of the construct.

In addition to the above findings, the results also indicated that the rating level of the dimensions concerning cooperative working atmosphere and importance were consistently high across all cases. This highlighted that the sense of importance among the team and the cooperation among them is key in their identity as a team.

7.4.5 Innovation effectiveness (IE) construct rating

The findings regarding innovation effectiveness from the case studies indicated a high rating level of IE for the SC case, and a medium rating level for the AKO and the JFZ cases (Table 7-2). The high rated IE project had a high level of effective/efficient innovation capacity and high-level future/expected innovation potential. The AKO had a medium level of both dimensions while the JFZ had a high rating level for effective/efficient innovation capacity and a low rating level for future/expected innovation potential, which yielded an overall medium rating of the construct.

7.4.6 Robustness of model dimensions

The findings from the case studies indicated about the reliability of the rated dimensions in representing the model constructs in addition to demonstrating the rating levels for each project. In Table 7-2, most of the dimensions within each construct appear to be consistently and positively correlated across all projects. Particularly, within the LI construct, at least four out of five dimensions appear to be consistent in all cases. Similarly for SI, all dimensions seem to be well correlated with one another, specifically those in the case of AKO and JFZ. In SC, at least two out of three dimensions are highly correlated. The IE construct show similar consistency in the SC and AKO cases, the JFZ case show a lack of correlation though, however, it is considered a minor inconsistency that can be overlooked and explained. Within the TI construct, at least 9 of 13 dimensions showed correlation in the SC and the JFZ cases. In comparison, the AKO case TI dimensions are inconsistent and show a lack of correlation. However, this discrepancy does not weaken the validity of the measurement model, since two out of three cases support it. Generally, the model dimensions proved to be adequately reliable in capturing the qualitative rating level of the constructs, thus lending support to the robustness of the model's structure.

7.5 Cross-case analysis findings

The previous section provided the overall rating summaries of the model constructs originated from the within-case analysis of the three case studies. To perform the cross-case analysis, the relationships between the rated constructs in each case were evaluated against the developed predicted patterns (Figure7-1). Table (7-3) presents the cross-case analysis of the three case studies, which elaborates on the assessment as to whether the cases match the predicted patterns.

Table 7-3: Cross case analysis results

Case	**Construct rating**					**Matching results**
	II	**LS**	**SI**	**TI**	**IE**	
SC	High	High	High	High	High	Perfect match to *Predicted Pattern1*
AKO	Low	High	Medium	Medium	Medium	Partial match to *Predicted Pattern 2*
JFZ	Medium	Medium	Medium	Low	Medium	Good match to *Predicted Pattern 2*

As presented in Table 7-3, the relationship patterns of the rated constructs in the SC case show a perfect match to *Predicted Pattern 1* (see Figure7-1). The high level of II indicates a strong correlation with the high level of the endogenous constructs (LS, SI, TI). The high level of the endogenous constructs in turn has a strong correlation with the level of IE (high), which indicates that the level of SI correlates with the level of IE. The pattern also supports the prediction that the level of LS correlates with the level of SI and TI, and that both SI and TI have a correlation among each other.

In the AKO case, the low level of II does not seem to have any effect on the endogenous constructs, which does not correspond with the relationship predicted. Moreover, LS is rated high, however, it yielded a medium rank SI and TI showing that they also do not correlate as expected. Nevertheless, the correlation between SI and TI match the predictions. In addition to that, the overall medium level of the endogenous constructs led to a medium level of the IE, which matches the Predicted Pattern 2. Since two predicted correlations did not match and the three other matched *Predicted Pattern 2*, the pattern was considered to have a partial match.

Finally, the results of the JFZ case indicates, as predicted in pattern 2, that the moderate level of II led to a general moderate level of the endogenous constructs and that in turn led to a moderate level of IE. There is only one discrepancy, which is the low rating of the TI construct that does not match the overall medium rating of the rest of the constructs. Despite this minor variation, the remaining relationship patterns in this case match predicted pattern 2, showing that the level of II (medium) correlates with the level of the endogenous constructs (LS, SI, TI), which then correlates with the level of IE (medium). As a result, since the overall relationship pattern seems to explain most of the relationships stipulated in the model, the case study results of JFZ was considered to have a good match with the Predicted Pattern 2.

7.6 Discussion

The results of the case study analysis of the three Dubai based mix-use residential construction projects presented above have provided an indication as to whether the model derived from the synthesis of the literature can be qualitatively validated (i.e. can be explained) by the findings of the cases under real work settings. Overall, the results suggested that the relationships between the constructs depicted in the model could be adequately explained by the results from the case studies. Out of the three cases, two had a perfect and a good match with predicted patterns, while the remaining case had a partial match. More specifically, the (SC) case show a perfect match to *Predicted Pattern 1*, while the (JFZ) case show a good match to *Predicted Pattern 2* and the (AKO) case show a partial match to *Predicted Pattern 2*. Based on the cross-case pattern matching results, the following sections provide a detailed discussion regarding the relationships between the constructs and the resulted outcome of innovation, along with factors that potentially can cause an unexplained variation among the model constructs.

7.6.1 Relationship between the model constructs

In the SC and the JFZ cases, a strong correlation between the II construct and the endogenous constructs (LS, SI, TI) provides support that interest in innovation strongly influences them. This potential causal relationship was supported by comments from most of the interviewed stakeholders as represented in section 6.6.1.. Particularly, the participants in the SC case strongly hinted that passion towards sustainability; personal interest in sustainability, and interest in sustainability for some mutual benefits among stakeholders is a major contributor in facilitating leadership for innovation, stakeholder integration and team identity to achieve effective innovation. As has been mentioned, participants in the JFZ case reflected less interest though in the sustainability concept itself and more interest in the financial aspect associated with it and the overall image that it reflects which yielded to a moderate level of interest that resulted in moderate levels of LS, SI and IE and a low level of TI. These findings further support the correlation between II and the rest of the constructs.

Assessing the similar relationship in AKO, it was found that a low II did not appear to influence the LS construct, yet, it had a negative influence on SI and TI and consequently IE making them moderately rated. Perhaps, the weak correlation with LS can be explained by the fact that there was a general, low level of interest in the realization of the sustainable aspects of the project; yet, the leader still had most of the qualities to lead for innovation such as team work development, encouraging and stimulating innovation and individualized support as discussed in Section 6.6. In addition to that, the high rating for LI in this case was attributed to the high rating of three dimensions that outweighed the medium rating of the 'stimulating and inspiring vision' and 'stakeholder integration' (Table 7-2). Hence, a correlation between the low interest in innovation and the medium rating of 'providing and inspiring vision' and 'stakeholder integration' is observed in this case.

The results obtained from the SC and JFZ cases fully supported the prediction that LS influences SI and TI. The participants from the SC project from the different stakeholder groups reflected positively about the leader's ability to inspire, encourage and support them as well as his ability to integrate stakeholders and develop a strong team (Section 6.3.4.1). The observation notes taken by the researcher also support the idea that the leader was enthusiastic with a very focused long-term vision and the bond between him and the team was obviously strong and respectful. In addition to that, he paid special attention to the importance of the right delivery of their ideas to the different stakeholders to minimize misunderstandings after contemplating their importance and power carefully to facilitate the diffusion of the innovation (Section 5.1.3). This was reflected in the high rating of all of the dimensions related to LS and the resulted high rating of SI and TI. Conversely, the participants of the JFZ project complained about the multiplicity of leadership levels in their project and the multiplicity of opinion, which interfered in decision-making and introduced an element of inconsistency. According to the interviewees, this restrained the team from creativity and innovation and created a sense of segregation between the team members and the leader in addition to influencing the decisions related to stakeholders (Section 6.5.4.1). The observation notes support that the assertion that the leader did not motivate his team to innovate despite the fact that he was open to new ideas and innovations. He was assertive and calm when dealing with high power and important stakeholders, while he was rigorous, loud, and superior when dealing with junior team members, contractor and sub-contractors (Section 5.3.3). This explains the medium rating of LS, which led to a medium rating of SI and the low rating of TI, and further supports our prediction that LS influences SI and TI. This outcome is consistent with Jung et al.'s (2003) argument that transformational leadership that is associated with innovation links the identity of the team to the collective identity of their organizations (project in our case), thus raising their intrinsic and extrinsic motivation to perform their tasks. It also supports Howell & Avolio's (1994) claim that leaders who inspire vision and establish mission raise the followers' understanding of the value of the desired outcome, thus raising their willingness to exceed their self-interests for the sake of the organization (project).

In the AKO case, the results indicated a high rating of LS but a medium rating of SI and TI, this can be regarded to the low rating of the 'stakeholder integration ability' and the ‘providing and inspiring vision’ dimensions. There was a general agreement among the participants in the AKO case study that the leader is dedicated and a very good manager, however he was not visionary and did not offer support to the team members which explains the moderate rating of TI. Through the conversation with the leader, the researcher noticed that he is facing a cultural barrier issue as he recently moved from another country, he had some issues adapting with the new language and culture which hindered his ability to deal with stakeholders as well, this further explains the moderate level of SI (Section 6.4.4.1). The observation notes also point out that the cultural differences between his country and Dubai made it harder for him to adopt the skills that were required to deal with stakeholders in this part of the world, which slowed down the process of getting approvals, establishing mutual interests and achieving agreements which explains the moderate level of SI. The observation notes also highlight the problem that while his relationship with the team was relatively good, the researcher noticed that there was a sense of hierarchy between the different employees in the project, which can justify the moderate level of TI (Section 5.2.3). Thus, regardless of the inconsistency of the predicted correlation, this elaboration explains the correlation between the three constructs and further supports our prediction that LS influences SI and TI. This result reinforces the findings from other studies like (Scott & Bruce 1994, Tierney 1999, Dackert et al. 2004, Yukl 2012), that point out that innovation is usually associated with change; therefore, the leader that can accommodate change is correlated with innovation, thus, the disability of the AKO leader to accommodate change readily and quickly, influenced the innovation team and stakeholders and consequently, the amount of innovation in general.

The results obtained from the SC and the AKO cases show a strong correlation between SI and TI which supports the argument that stakeholder integration and team identity have an influence on each other. This was reflected in the high rating of SI and TI in the SC case and the medium rating in the AKO case. Since the innovation team consists of the major internal and external stakeholders of the project as discussed in Sections 5.1.5, 5.1.6, 5.2.5 & 5.2.6, stakeholder integration and team identity were presumed to have direct effects on each other. As mentioned previously, the SC leader facilitated stakeholder integration and provided support to the innovation team leading to a high rating of SI and TI. The observation notes supported that the leader highly encouraged increasing the amount of knowledge about stakeholders, facilitated coordination and collaboration among them and enhanced the team's adaptation to their behaviour, which was reflected in the interdependence and cooperation among the team, their very strong sense of team membership, attachment, satisfaction, and importance. The participants corroborated this observation by repeatedly mentioning the influence that the integration of stakeholders had on the overall success of the project and how their leader paid special attention to this aspect and encouraged it within the innovation team (Sections 6.3.4.2 & 6.3.4.3). The results from the AKO case agree with this correlation since a medium SI yielded a medium TI. As discussed earlier, the leader of AKO was not very proficient in integrating stakeholders and developing strong team identity, which was reflected in the rating of the constructs in this case. The observation notes reflect on this aspect too, they demonstrate that the leader had a struggle in dealing with stakeholders and convincing them about the innovation because he claims that they are financially driven and they associated innovation with additional risk along with other reasons discussed in Section 6.4.4.2, consequently, he couldn't highly integrate stakeholders. This weakness was reflected in the team's identity as well. Although the team was very skilled, professional and proud to be part of the project, they did not seem to have clear boundaries, which did not facilitate the exchange of information and expertise. Moreover, not all of them were aware of the innovation goal and there was no unified perception about it among the team. These interview results and observation notes further support the correlation between LS, SI, and TI. These findings are also consistent with Rese & Baier's (2012) argument about the importance of developing a specific self-concept as a team that reflects the identity of the innovation team to enhance innovation in organizations and projects. Furthermore, the findings further support their claim about the importance of the role of management in building innovative teams since they must create and/or assure suitable conditions for the stakeholders and the team members to be interested in the innovation and to maintain a strong identity and sense of belonging within the team. Also, the findings from the AKO case reinforce the findings from Rese & Baier (2012) that link the membership of a specific team to the group's boundaries. This issue is vital in construction projects as the team members are assigned from different organizations and at any one time they interact with different groups and stakeholders, hence, the boundary of the project team cuts across formal boundaries of different organizations. Therefore, being aware of the goal of the innovation and having a clear definition of the goal assists in strengthening team membership and increase members' commitment to the common goal.

The results of the JFZ case do not match the predicted correlation because SI was rated medium and TI was rated low. This can also be attributed to leadership. As mentioned earlier, the leader of JFZ was very diplomatic in dealing with powerful and important stakeholders and he had the necessary skills to facilitate collaboration and adapt to their behaviour, while he was superior when dealing with junior team members, contractor and sub-contractors and lacked the skills to create a sense of identity and integrate them with the other stakeholders, which resulted in a lowered team identity rating (Section 5.3.3). Despite that, the team was cooperative, and revealed cohesion and a sense of importance and tried to work professionally to achieve self-satisfaction and perhaps win an award that their organization offers for good performance. This finding also supports the correlation between LS, SI, and TI. It also corresponds with Rowley (1997) and Galaskiewicz & Wasserman (1989) stakeholders network theory as they claim that when interconnections within the network get denser, innovation expectations are likely to increase and diffusion is more likely to be facilitated. In contrast, when networks are centralized, as in the JFZ case, fewer active ties are represented between stakeholders.

The findings from the case studies provided a strong support for the prediction that LS, SI and, TI influence IE. When the overall rating of the endogenous constructs was high (SC case), IE was rated high as well, and when the rating of the endogenous constructs was medium (AKO & JFZ cases), the rating of IE was medium, too. This relationship can be exemplified by comments made by the participants from the three cases. The participants from the different stakeholder groups in the SC case repeatedly mentioned that working all together along with stakeholders for the purpose of sustainability helped them in achieving their innovation financially and environmentally. They have also pointed out that the integration of some stakeholders like universities, end users, and contractors at early stages influenced the innovation positively (Section 6.3.4.4). Nevertheless, the participants in the AKO case were not very positive about the effectiveness of the sustainable innovations in their project and they attributed that to the enforcement of many green regulations that stressed the team and killed their creativity, in addition to the challenged stakeholder integration that caused difficulties within the innovation team (Section 6.4.4.4). Similarly, the JFZ participants attributed their challenged innovation to the financially driven leaders that did not encourage and stimulate innovation within the team and overlooked the importance of some important stakeholders in decision-making (Sections 6.5.4.1 & 6.5.4.4). These findings further support the correlation between IE and the rest of the constructs.

In conclusion, the findings from the case studies of three Dubai based mix-use residential construction projects support the view that the empirically developed model can be sufficiently explicated by the actual relationships between the constructs and their contributions towards innovation effectiveness. This was evident from the results of two cases indicating a good-to-perfect match and one case indicating a partial match to the developed predicted patterns. The partial mismatch was explained and a rationale for the discrepancy was provided. When taking these explanations into account, it seems that the results provide better support to the model. Therefore, the outcome of the case studies led to corroborating the relationships between the model constructs and the development of the following revised version of the model.

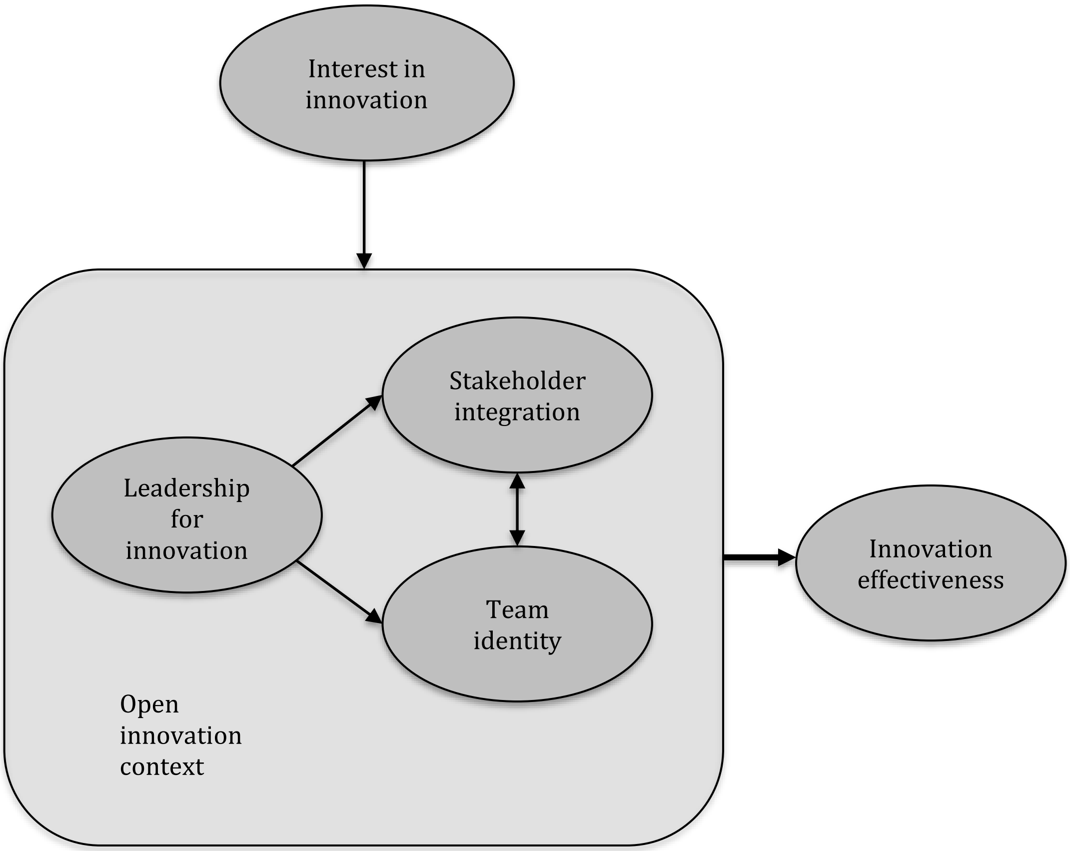


Figure 7-2: Revised conceptual model

7.6.2 Stakeholder integration and innovation effectiveness

The main purpose of this study is to explore the effect of stakeholder integration on innovation effectiveness in open innovation construction projects. Through the synthesis of the literature and the analysis of three case studies, it was found that stakeholder integration is influenced by a number of factors throughout the project lifecycle that cannot be ignored while conducting the research, which are fundamentally influenced by leadership for innovation and team identity. Considering these aspects and after a thorough review and synthesis of the literature, a conceptual model was developed predicting relationships between leadership for innovation, stakeholder integration, team identity, and innovation effectiveness. Through analyzing the interview data, observation notes and official documents, it was found that leadership for innovation indeed affects stakeholder integration and team identity and that the later two influence each other, in addition, these three constructs influence innovation effectiveness. This finding is consistent with Fawcett & Magnan's (2002), Murphy et al (2011), Ozorhon (2013), and Naoum and Egbu (2016) claims that it is important to ensure effective integration and coordination of the different parties for achieving outstanding innovation. The findings also agree with the argument of Saint-Paul (2003) and Koschatzky (2001) that the networked nature of open innovation allows for more innovation opportunities, it was evident from the cases that a denser network of stakeholders yielded a more effective innovation. It was also evident that considering a wide range of stakeholders from the beginning of the project is vital for an effective integration of stakeholders to occur, and the SC case provides proof that secondary stakeholders such as, end users, media and universities, that were singled out by Hall & Vredenburg (2003) and Olander & Landin (2008) have an important role in achieving better innovation. Focusing on a narrow range of stakeholders in the AKO project led to unexpected rejection from the media who criticized the effectiveness of their sustainable innovation. This finding further supports Hall and Vredenburg (2003) and Hart and Sharma's (2004) argument that unexpected rejections and hindrances from stakeholders that are ignored will be faced later when attempting to deliver the innovation. The following diagram was developed based on the analysis of the different case studies, and it shows the different integration zones that are necessary to achieve the innovation goal throughout the lifecycle of the construction project. Each zone requires the integration of different types of stakeholders and areas where the innovation can be open for external participation.

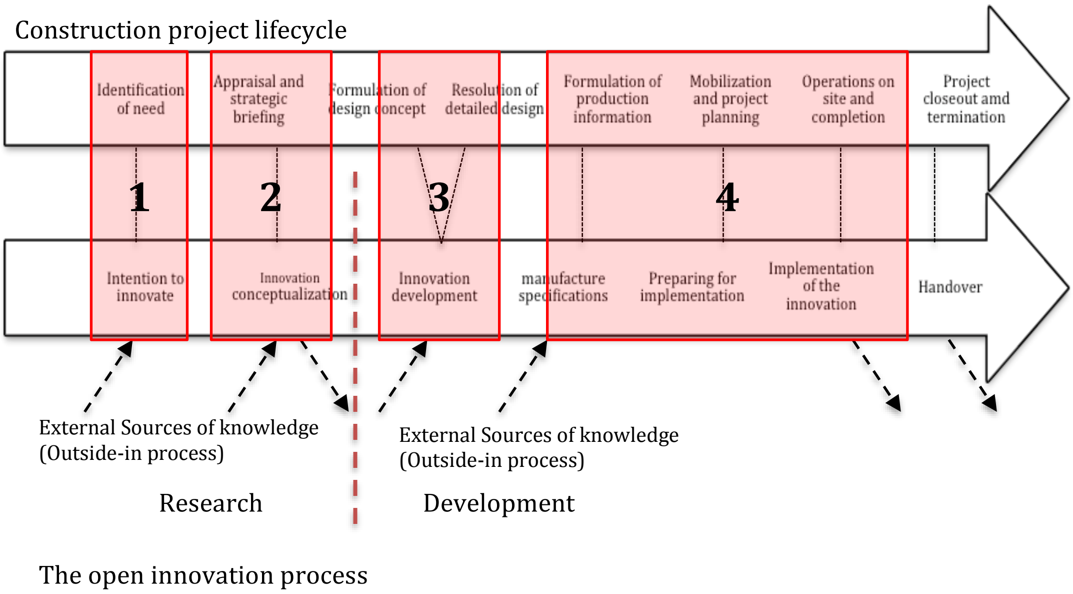


Figure 7-3: Integration zones in the alighned project lifecycle and innovation process

Zone 1 is very critical in the innovation process. The driver and intention to innovate is the starting point of the process. This point requires an interest in innovation from the client/owner side as learned from the case study analysis. In the context of our study, achieving sustainability is the main driver to innovate in response to the pressure exerted by clients, government, and other stakeholders for the industry to be more accountable for its environmental impacts. In Case 1 there was a personal interest from the owner himself in sustainability, whereas in the two other cases, their drive was the pressure from the city officials to achieve sustainability in addition to achieving a competitive advantage in the market. Therefore, this research supports the findings of earlier work that reported building regulations and requirements as the major drivers of innovative solutions in the construction sector (Ozorhon et al. 2014; Herazo & Lizarralde 2015). It also provides evidence for the assertion of a number of recent research studies (Yukl 2012; Tabassi et al. 2016; Ville & Yang, 2017; Alwan et al. 2017) that clients/owners promote innovation in construction projects through their championing characteristics. At this stage, in an open innovation context, the client/owner can discuss his idea with a potential partner, research entities, and/or design professional to clarify the idea and enhance it further as in the SC and the AKO case whereas, in a closed setting, the idea is not discussed in favour of protecting their intellectual property and to save the innovative idea from the risk of adoption by competitors which could hinder the realization of innovative ideas.

Zone 2 is important for developing the conceptual form of the innovation as a philosophy and to begin to formulate and develop it for practical application. At this stage the integration of the client/owner, innovation leader, design team, consultants, research entities, customers, authorities, suppliers (if it is a product innovation) is very crucial as the brief is developed. The most intensive integration procedure has to take place at this stage since judgments about the suitability, viability and the initial implications of the innovation take place, therefore, presenting and educating stakeholders about the idea is fundamental and requires the personality and skill set of an innovation champion. The SC case illustrated an example where the client/owner emerged with the idea for the innovation in response to his personal interest in the subject, therefore he was the innovation leader. Analysis revealed that his and his partner's role thereafter was to sell the idea to the rest of the team (i.e. design team) and stakeholders to consider its suitability for the project, was a very important stage that led to the success of the other stages of the innovation process. This though was not the case in AKO, where the innovation leader was not able to communicate his ideas to the different stakeholders and they were killed before he could develop them further. Therefore, in response to the need to innovate, the VP of design interfered and provided along with his team, sustainable solutions to the design of the buildings. In contrast, in the JFZ case, the contractor, who provided the innovation product, was not considered at this stage of the process and the designs were developed without considering the product and this hindered the innovation process and caused changes in the design at the development phase of the project. This further supports the notion that the integration of the major players in the innovation process is important at this stage and supports a group of researchers' (West and Bogers 2014; Ozorhorn et al. 2014; Ozorhon 2010) argument that the integration of stakeholders at different stages in the project lifecycle is crucial for innovation.

It is also important at this stage the the innovation goals are defined and the team is selected according to their personalities and mind-sets that support innovation, and further that all team members should be encouraged to develop new ideas and practices. Previous experience, outsourcing R&D, consultancy, knowledge sourcing from universities, and end user input were used to develop the innovative solutions in the SC case, which led to an outstanding innovation. Whereas in the AKO and JFZ cases, less focus was paid on end users and universities which led to medium to low levels of innovation. This finding provides evidence that not only internal sources, but also external sources, are essential for idea generation and development, as Chesbrough (2006), West and Bogers (2014), and Enkel & Gassmann (2008) have argued in studies dealing with innovation. This further indicates that joint effort is required to innovate in construction and collaboration among project members is an essential ingredient.

This research further supports Walker et al. (2003), Kumaraswamy & Dulaimi (2001), and Naoum & Egbu (2016) who have argued that procurement strategy can greatly influence the scope and capacity for innovation within a project. In the SC case, a design-build and partnering approach led to greater innovation capabilities whereas the AKO the traditional design-tender-build approach yielded lower levels of innovation in spite of the adoption of green building certifications (GBCs), which Herazo and Lizarralde (2015) have argued can significantly influence the processes of collaboration and innovation. On the contrary, most of the interviewees in this case mentioned that the GBCs restricted them from innovating as they were subjected to massive pressure to meet their criteria. In the JFZ case, having a project management procurement approach was beneficial at a management level; however, the personal traits of the selected project manager hindered creating a common identity within the team and obstructed innovation. This finding is crucial in realizing that studying innovation at a project level needs to be holistic and comprehensive. Studying procurement methods that enhance innovation disjointedly based on the traits of the leaders and the innovation team does not always lead to credible outcomes.

Zone 3 is essential for convincing decision makers that the innovation has been developed sufficiently to enable it to be implemented through presenting feasibility, technical, financial, risk and impact assessments and the different activities of planning. Following this planning work, the integration of the innovation team and contractors is crucial. The thoroughness with which the innovation team assessed the overall suitability of the project and planned its implementation with clear objectives specified for the contractors to achieve in the construction phase is very important. In the SC case, the procurement method integrated the contractor at the early stages of the planning process, which advanced the collaboration and communication between the major players at this stage and resulted in having a motivated contractor with a strong identity and commitment to the innovation. On the other hand, there was a sense of segregation and hierarchy between the contactor and the other major stakeholders at this stage in both AKO and JFZ, which resulted in miscommunication and poor collaboration. This created a tense environment between the contractor and both the design team and the leader of the project and caused last minute changes and delays in the project. It also reduced the opportunity for implementing some innovative solutions proposed by the contractor. This finding further supports Thomson and Munns (2010) assertions that it is critical to integrate, involve and empower stakeholders at the development stage and to ensure a successful communication flow between them to achieve successful innovation.

Zone 4 includes the implementation phase of the innovation process where the developed concept transforms into its practical function. The integration of the innovation leader, design team, contractor(s), subcontractors, and suppliers is crucial at this stage. Stressful situations have to be endured by maintaining successful communication channels between the different stakeholders. The on-site project manager's role is fundamental at this stage to conduct feedback, improvement, and evaluation meetings, to ensure resources control and allocation, to integrate contractors, and to warrant appropriate standards and quality. In the three cases, the on-site project manager was very rigorous, systematic, understanding and up to the level. However, communication between the project manager and the other stakeholders differed in each case. In the SC case, the project manager discussed the challenges that he faced onsite and the difficulties that the team encounter to achieve their targets, then he mentioned that these challenges are resolved through their weekly meetings with the leader of the project himself. He added that the ease of coordination and collaboration with the design team and the contractor also helped to get the work done on time and schedule. This was missing in the AKO case where the project manager complained about contractors and the contractors complained about the miscommunication with the project leader and the design team. There was an obvious segregation between the stakeholder at this stage with resulted in tensions between stakeholders and challenges in getting the work completed. This further supports Thomson and Munns (2010), Huang et al. (2014), and Lavikka et al. (2015) argument that coordination and communication flow are two very crucial aspects to consider in integrating stakeholders to achieve successful innovation.

These different integration zones incorporated the integration of different stakeholders and required different integration mechanisms. This research enriches the innovation literature by identifying those integration zones that are essential to consider at the different stages of the project lifecycle and the innovation process to successfully manage the whole process and consequently achieve effective innovation. As observed in the three cases, this process requires an overall innovation leadership layer to direct the phases of the innovation process with the necessary management techniques and the right integration mechanisms.

This research also enriches the innovation literature by identifying major aspects that influence the effectiveness of innovation along with stakeholder integration. It complements and further supports Ozorhon's (2013), Ozorhon et al. (2014), Tabassi et al. (2016), and Alwan et al. (2017) arguments about leadership and integration as enablers of innovation. In addition, it adds new elements, which are stakeholder integration and team identity, to the major influencers of innovation that Blayse and Manley (2004) identified, which are absorptive capacity, innovation champions, knowledge codification and an innovative strategy. It also challenges Blayse and

Manley’s (2004) ‘innovation champion’ element and suggests that ‘leadership for innovation’ is a more comprehensive element since it includes different leadership styles that support innovation such as transformational leadership and task-oriented leadership styles. In addition to that, this research established the relationship between stakeholder integration and team identity, which to the researcher’s knowledge has not been raised before in the literature. It supplements Rese and Baier (2012) and Ashmore et al.’s (2004) research by shedding light on the influence of integration on the identity of innovation teams and vice versa.

Therefore, this research has responded to Enkel et al.’s (2009) call for more research and empirical studies about mechanisms to enrich theory and practice in the open innovation literature, and has empirically proven that there is a positive relationship between stakeholder integration and open innovation effectiveness. However, as anticipated, this relationship is not direct and static, but rather, a dynamic one that is influenced by a number of factors to achieve the overall goal of the innovation. In considering the multidisciplinary, multiparty environment in the construction field, and through an analysis of innovation at the project level crossing organizations boundaries, this research produced more relevant data that revealed the conditions under which innovation can be effective in a construction project setting. It uncovered the strong effect that leadership for innovation has on stakeholder integration and the identity of the innovation team. It has also empirically examined the relationships between these factors and revealed that leadership for innovation have to have an interest in innovation, enable the integration of stakeholders and the development of a strong team identity through encouraging and stimulating innovation, providing an inspiring vision, providing individualized support, and enhancing teamwork, in addition to the selective hiring factor that the researcher personally detected while conducting data analysis. Selectively hiring people that are interested in innovation and highly capable of enriching and adding to the innovation have been observed to be highly influential on stakeholder integration and team identity, since it is under the leader's power and responsibility, it was added as a dimension under leadership for innovation, nevertheless, it needs more research to be confirmed. These leadership characteristics enable the effective integration of stakeholders through developing a thorough knowledge of stakeholders, facilitating interactions among them and adapting to their behaviours. The main challenges in stakeholder integration that was observed in all cases is the miscommunication among stakeholders, either because of a language difficulty or the disqualification and ignoring of some stakeholders in addition to slow responses by the institutional authorities and continuous changes or new requirements. Moreover, it was observed that the late integration of some stakeholders caused several unexpected problems. Hence, these issues should be taken into consideration to facilitate effective integration of stakeholders. These stakeholder integration issues are strongly related to the identity of the team as well. It was found that innovation teams that are integrated possess a well-developed and strong sense of membership of the innovation group, hence, crossing boundaries and providing their full effort and potential for the sake of the innovation, whereas, teams that have a disputed integration, faced challenges in developing a clear identity, therefore, they worked basically for self-interest and satisfaction and showed a decreased enthusiasm towards innovation. All of these aspects were empirically proven to have a direct influence on the effectiveness of the overall innovation; hence, confirming the conceptual model that was developed based on the literature and assumed relationships.

7.7 Chapter Summary

This chapter discusses the outcome of the research undertaken to confirm the relationships between the constructs in the developed conceptual model. It presents an evaluation conducted to assess whether the model derived from the synthesis of the literature can be explained by the selected cases of actual construction projects. The analysis of the collected qualitative data involved two phases, within-case and cross-case analyses. Within-case analysis findings provided the rating level summary for the constructs as well as indications of the robustness of the model dimensions for explaining the constructs. Then, a pattern matching technique was used to conduct a cross-case analysis in order to link the rated constructs and represent the patterns of relationships, which were then assessed by comparing them with the predicted patterns developed from the model.

The results of the case studies confirmed the model constructs and indicated that the model can be adequately explained by the actual phenomena within the sampled cases. It corroborated the relationship between interest in innovation, leadership for innovation, stakeholder integration, team identity and innovation effectiveness, and enabled the researcher to reach to an understanding of how stakeholder integration is influenced in an open innovation construction project and subsequently how influences innovation effectiveness.

Chapter 8- Conclusions and recommendations

Introduction to Chapter

This final chapter summarizes the research endeavour with its main findings and contributions. Section 8.1 provides the outcomes of the study correlated with the objectives of the thesis, followed by section 8.2, which discusses the major contribution of this research to knowledge and practice. Section 8.3 provides the limitations of the study then section 8.4 points out recommendations for future research. This is followed by a closing section of the thesis.

8.1 Research objectives and outcomes

The principal aim of this research study was to investigate empirically the influence of stakeholder integration on open innovation effectiveness in construction projects. More specifically, it aimed to develop an empirically tested model that demonstrates the relationships between the main factors that affect stakeholder integration, and understand how these relationships influence innovation effectiveness during the lifecycle of the construction project, accordingly. In order to achieve this aim, the following thesis objectives were formulated and addressed throughout the research endeavour:

1. Examine the integration of stakeholders throughout the construction project lifecycle and the open innovation process
2. Identify leadership characteristics that enhance the integration of stakeholders and creates an identity among team members throughout the project lifecycle in an open innovation context

3. Examine the relationship between stakeholder integration and team identity in an open innovation context in construction projects
4. Identify innovation team characteristics that facilitate the achievement of effective innovation.
5. Investigate the relationship between the innovation leader, stakeholder integration, and team identity and their effect on the innovation
6. Develop an empirically-tested model that encapsulates the above identified constructs and the uncovered relationships, which can then be used to depict the mechanisms of enhancing innovation effectiveness in construction projects.

To achieve such objectives, a number of rigorous research activities were carried out. These activities, along with their associated outcomes, are now summarised below in Sections 8.1.1 – 8.1.3.

8.1.1 Establishing theoretical framework

To establish a clear theoretical framework, a critical review of the existing literature was conducted as presented in Chapter 2. Specifically, the study focused on reviewing, within both generic and construction-specific contexts, the literature related to innovation and stakeholders. This resulted in the central thesis of this study building on the idea that the innovation process is highly aligned with the project lifecycle and that different stakeholders have to be integrated at different points in the process using different integration mechanisms to achieve effective innovation outcome. Further reviews of the literature uncovered that leadership plays an important role in managing and establishing stakeholder integration and the identity of the innovation team, especially in the context of open innovation that requires cross-boundary collaboration and extensive intra- and inter- stakeholder interactions.

However, the links between these aspects were vague and the need for more empirical research to establish the nature of these links was identified. As presented in Chapter 3, these pivotal concepts led to the development of a theoretical framework emphasising the impact of stakeholder integration on the effectiveness of innovation in an open innovation context. Since these issues have not been comprehensively examined from the standpoint of empirical research, five overarching research questions were developed to address this gap in the literature. The theoretical framework and associated research questions formed the foundations for the development of the conceptual model presented in this thesis.

8.1.2 Model development and qualitative assessment

In order to provide answers to the research questions, a conceptual model was initially developed based on the established theoretical framework mentioned above. As presented in Chapter 3, the model comprises three main endogenous elements: leadership for innovation, stakeholder integration, and team identity and an exogenous construct, which is innovation effectiveness. These model constructs were then operationalized and a synthesis of the literature was undertaken to understand each construct, its related dimensions and measures. Based on this synthesis, a set of propositions and expected relationships that link the model constructs were articulated. The model proposes that in an open innovation construction project context, leadership for innovation has an influence on stakeholder integration and team identity, and that the later two have an influence on each other. As a result, the effectiveness of the innovation is influenced by the combination and interaction of these relationships. To assess these relationships, a qualitative case study approach was undertaken as has been discussed in Chapter 4. This method was found to be the best one to explore the relationships between the model constructs and explain them.

Through observation, long-term interaction and socialization with the stakeholders and the innovation team members, it was believed that an in-depth and more realistic understanding of the nature of their relationships could be achieved that would lead to more accurate, representative and vibrant conclusions. Case study analysis included approximately 35 hours of nonparticipant observation of three cases, 30 hours of semi-structured interviews, and document analysis. These different methods of data collection were conducted to enhance the depth and breadth of knowledge about the subject and contributed towards achieving the objectives of this research. As presented in Chapters 5 & 6, after an examination and assessment of the open innovation context in the three cases, an analysis of the different constructs of the conceptual model was performed. This analysis aided in revealing the main correlations between the constructs and their dimensions and enabled the researcher to obtain an understanding of how stakeholder integration is influenced in an open innovation construction project, and subsequently, how it influences innovation effectiveness. The findings proved that stakeholder integration is highly influenced by leadership for innovation which in turn affects the identity of the innovation team, and vice versa. The relationship between these aspects has a direct effect on the innovation outcome. The factors that influence each of these constructs were also thoroughly studied and discussed. These findings facilitated the achievement of objectives 1-3. Furthermore, a new external category was realized in the process which is 'interest in innovation'; this category arose several times in the conversation with stakeholders, it led to the awareness of its importance and its significant influence on the innovation. Therefore, after an analysis of this element, it was added to the developed conceptual model to enhance the achievement of objective 4.

8.1.3 Qualitative model evaluation

As described in Chapter 4 and presented in Chapter 7, the model evaluation involved two key analysis steps: within-case and cross-case analyses. The findings of the case studies supported the validity of the model by the three case studies. Almost all of the dimensions of the model constructs were well correlated in the three cases. This indicated the reliability of the dimensions in evaluating the actual phenomena, therefore, supporting the robustness of the model's structure. In addition to that, the pattern matching results across the three cases showing a good-to-perfect match in two cases and a partial match in one case represented a convincing correlation between the constructs' relationships. The partial mismatch was due to the low level of interest in innovation that yielded to a high rating of leadership for innovation. This can be explained by the fact that there was a general, low level of interest in the realization of the sustainable aspects of the project; yet, the leader still had most of the qualities to lead for innovation which led to a medium rating of integration and team identity. This partial mismatch was outweighed by the two other good to perfect matches, hence, the results indicated that the empirical model could be comprehensively explained by the qualitative findings from the case studies and this contributed to the achievement of objective 4 and the establishment of the following final version of the model.

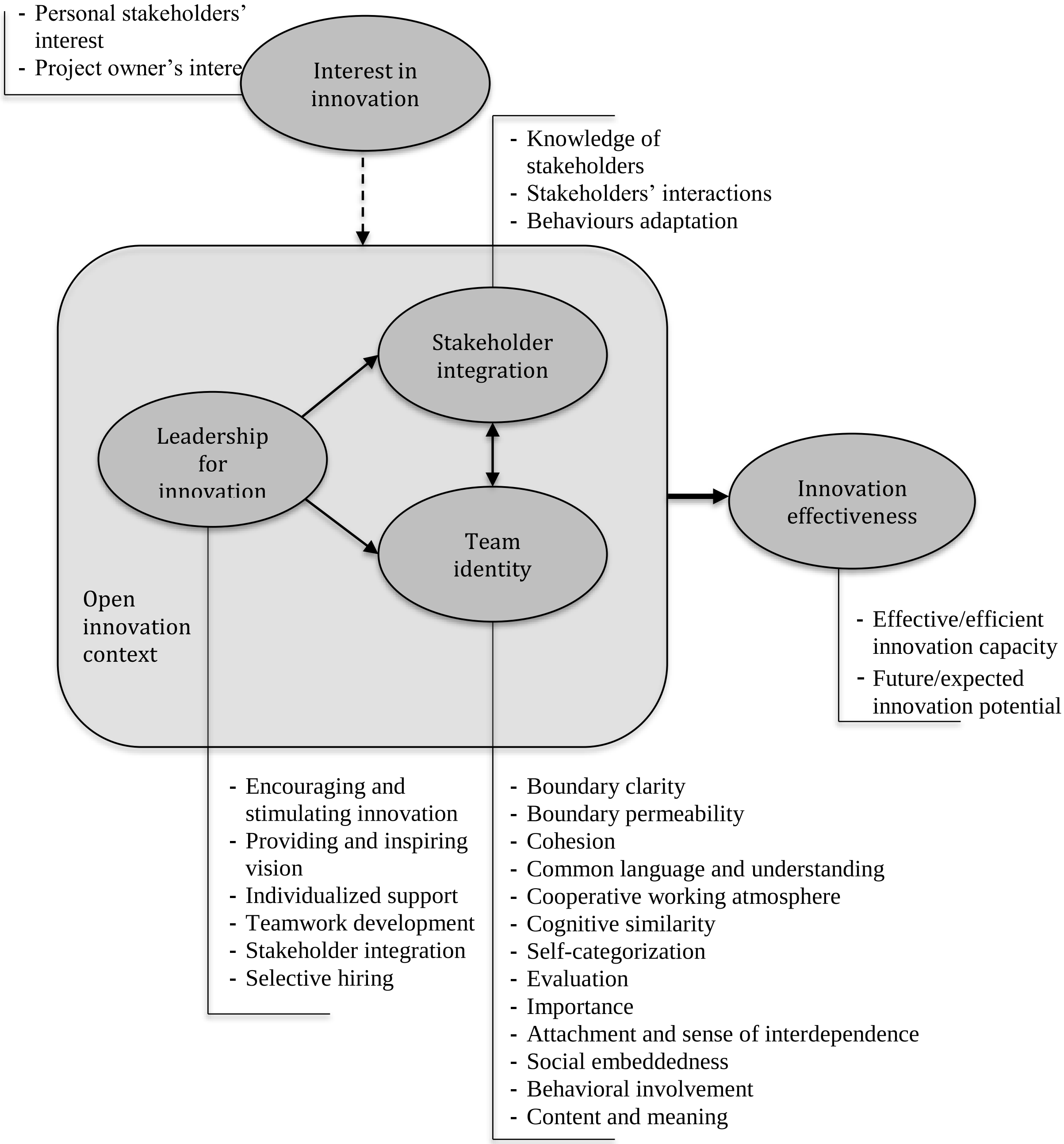


Figure 8-1: The final model

8.1.4 Research study conclusions

This research utilized a case study methodology to evaluate a model that was developed based on literature. The qualitative model assessment using within and cross case analysis aided in corroborating the relationships between the model constructs namely, leadership for innovation, stakeholder integration, team identity and innovation effectiveness.

In general terms, the following conclusions can be drawn from this study:

- Innovation in the construction sector is considered to be low, therefore, an understanding of the factors that enhances inter- and intra- collaboration between the different stakeholders and team members is crucial to achieve effective innovation.

- Innovation benefits can best be achieved through organized effort to invest in new ideas and convert them into practice in a systematic way.

- The open innovation literature falls short in providing knowledge about the influencers of innovation at the construction project level. The factors that are discussed in the literature are fragmented and the links between them are missing, therefore, there is a gap that needs to be filled in order to provide a more holistic viewpoint on what takes place in an innovation project setting.

- From the synthesis of the literature, it was determined that the essence of innovation effectiveness could be explained through leadership for innovation, stakeholder integration, and team identity.

- Innovation in construction can only be achieved through understanding client requirements and their integration and collaboration throughout the whole project life cycle, and the alignment of the project life cycle and the innovation process with an overall leadership level that facilitates the integration of both processes.

- Both the construction project lifecycle and the innovation process are closely aligned and that there are four zones where different kinds of stakeholders have to be integrated through different types of mechanisms that the leader facilitates.

- Procurement methods that encourage the integration of stakeholders such as design-build, partnering, and project management, lead to better innovation outcomes, so long as the personal traits of the leader and the team involved encourage innovation.

- Early contractor involvement and integrated working are enablers of successful outcomes by minimizing the discontinuities within the value chain.

- Strategic partnership between the client, the contractor, and the different stakeholders help the teams achieve their targets starting from the design phase and throughout the project's operation.

- Collaboration, coordination, and sharing knowledge and best practice among stakeholders can improve the culture and skills of the workforce and are therefore crucial for innovation success.

- Leadership for innovation highly influence both stakeholder integration and team identity and all of these factors directly influence the effectiveness of the innovation,

- From the research findings and literature review, a conceptual model was developed that represents the relationship between the previously mentioned elements, the main factors that influence them were also presented and analyzed and a new construct ‘interest in innovation, was added as an exogenous factor due to its persistent appearance in the data.

- From the research findings, it was proven that leadership for innovation highly influences the effectiveness of innovation through providing vision and encouraging innovation, building interested teams with strong team level- and individual-level identity towards the innovation, and integrating stakeholders by developing a knowledge base about them, facilitating interactions among them, and adapting to each others’ behaviours.

- Finally, the proposed model was verified and confirmed enabling construction projects to assess and improve the status of their innovation.

8.2 Study Contributions

Over the last two decades, innovation has proven itself to be a modern source of competitive advantage, especially so in the construction industry whenever it is associated with sustainable outcomes. Realising this phenomenon, a significant number of construction firms have expended a large amount of resources in an attempt to innovate to maintain their competitiveness. However, not all of these attempts have been successful. Many scholars have sought to understand the causes of such successes or failures. In spite of the abundant research efforts, there is still a need for more studies that advance the existing body of knowledge and establish practical research conclusions that can benefit the construction industry. Bearing this in mind, this research study was conducted to provide a theoretical advancement in the area of innovation research in addition to delivering practical contributions for the project management of innovation within the construction context. These contributions are presented below.

8.2.1 Contributions to the existing body of knowledge

Undoubtedly, the majority of past research on construction innovation has provided invaluable knowledge about the current state of innovation and the critical factors affecting innovation in the construction industry. However, the relationships between these factors have not been substantially examined from an empirical standpoint, particularly those factors affecting innovation at the project level. More specifically, very little attention has been given to stakeholders' influence on innovation despite their discernable impacts on construction projects.

In an attempt to fill these gaps in our research knowledge, this study has developed a model, which encapsulates key constructs that influence innovation effectiveness in construction projects that aim to achieve sustainable innovations. By drawing attention to the aspects that affect the innovation outcome and uncovering the mechanisms for enhancing the achievement of effective innovation, this study offers significant and unique contributions to a small but growing body of research concerning innovation management in construction. Specific contributions to the current research body of knowledge are elaborated below.

- The study provides empirical evidence that assists in unraveling the complex relationships that influence stakeholder integration and consequently the effectiveness of innovation, which includes leadership for innovation and team identity that are highly affected by their interest in innovation. This is highly important because understanding such relationships provide an accessible channel to target interventions for improving existing project conditions. Among the three constructs, leadership for innovation was found to be a very influential construct because it influences both stakeholder integration and the identity of the team. This finding highlighted the critical role that leaders play in bringing about the right stakeholders and team members and directing them towards achieving the innovation goal while considering the different needs of each stage of the project lifecycle along with the innovation process. By appointing highly innovation-conducive leaders, the level of innovation effectiveness could be significantly improved.

- The study illustrates and discusses the alignment between the construction life cycle and innovation process, which is rarely discussed in the literature, and provides a model to represent this alignment along with identifying the different zones that require the integration of different stakeholders and use of specific integration mechanisms. It also provides evidence that the most critical stage to integrate stakeholders to achieve the innovation goal is in zone 2 which is the innovation conceptualization and project briefing phase.

- The study reveals that clients are key stakeholders driving innovation especially if they are also the developers of the project. Their capacity to exert influence on individuals and teams in a way that fosters innovation is very significant. They can influence innovation by different means such as, identifying specific novel requirements to be delivered by other stakeholders; exerting pressure on project participants to improve project lifecycle performance, overall characteristics, and project flexibility to cope with unforeseen changes; and in general demand higher standards of work. The more knowledgeable and experienced the client, the more likely it is to stimulate innovation in projects.

- The study provides empirical evidence that stakeholder integration is critical in facilitating the achievement of effective innovation. The foregoing result underlies the importance of understanding stakeholders, facilitating interactions among them and adapting to their behaviour bearing in mind the different types of internal and external stakeholders and their associated power, legitimacy and urgency. Whilst this finding coincides with previous research, this study is the first to provide empirical evidence that establishes the relationship between stakeholder integration, innovation team identity and innovation effectiveness. To the best of the researcher's knowledge, was not empirically analysed before in the literature. Hence, this research reveals new elements that should be taken into consideration to facilitate an effective integration of stakeholders and consequently an effective innovation.

- The study uncovers how the level of integration among stakeholders can be affected by the selected procurement system. The traditional design-tender-build approach has been proven to lead to less integration and consequently less innovation effectiveness. In contrast, procurement methods that tend to integrate stakeholders and team members such as the design-build and partnering approaches led to higher levels of integration (especially between the design and construction functions), learning, communication and coordination among stakeholders, which overall resulted in higher levels of innovation.

- The study highlights that green certifications, regulations and policies can have a negative effect on innovation. Although they are often seen to promote innovation, the pressure they exert on the team within a limited timeframe can hinder team members from being creative and innovative as they give their full attention to meeting the requirements. For the management level, procedures and documentation required for certifications are part of a larger goal. By contrast, other stakeholders see them as extra work with supplementary fees that, together, increase stressful situations and tensions.

- The study provides empirical evidence that integrated teams with a strong sense of membership and identity to the innovation group provide their full effort and potential for the sake of the innovation. This element was not attended to in previous research in the construction innovation management literature, therefore, this research is one of the first studies which provides empirical evidence that stakeholder integration and innovation team identity are interdependent, therefore, it links social identity theory with the construction and innovation theories. The study further reveals that the integration and identity of the innovation team is highly influenced by leaders. Hence, it adds a new element that leaders of construction projects ought to consider to achieve their innovation goals.

- Finally, the study provides empirical evidence that open innovation has to be well-thought out and project managed to integrate the multi-disciplinary and multi-party stakeholders who cross-boundaries of their organizational settings along with the innovation team to achieve the best outcome of open source innovation. This can only be achieved with an innovation-oriented leadership that is highly interested in innovation. Therefore, this research adds to the emerging literature of open innovation.

8.2.2 Contribution to practice

Apart from theoretical contributions, this study also provides practical contributions relevant to practitioners working in the construction industry. As a major outcome of this study, the empirical model could assist projects in diagnosing the condition of their innovation. In addition, the study produced another model as an outcome of the study, which aligns the project life cycle and the innovation process and identifies zones of integration along the process. The realization of the different integration zones or areas is necessary to find the proper mechanisms for integrating diverse types of stakeholders at different stages of the project lifecycle to enhance innovation.

This research identifies four zones of integration.

- Zone 1 is the initial stage and is very critical in the innovation process as the driver and intention to innovate takes place. At this stage, there should be an interest in innovation from the client/owner side. The integration of the client/owner, potential partner(s), research entities, and/or design professional to clarify the idea and enhance it further is necessary to enhance innovation.
- Zone 2 is important in developing the conceptual form of the innovation for practical application. At this stage the integration of the client/owner, innovation leader, design team, consultants, research entities, customers, authorities, suppliers (if it is a product innovation) is very crucial as the brief is developed. Presenting and educating stakeholders about the idea is fundamental and requires the personality and skill set of an innovation champion. It is also necessary to define the innovation goal and select team members according to their personalities and mind-sets that support innovation. In addition, the procurement strategy should be well thought through at this stage as it can greatly influence the scope and capacity for innovation within the project.
- Zone 3 is essential in convincing the decision makers that the innovation has been developed sufficiently to enable it to be implemented. At this stage, the integration of the innovation team and contractors is crucial. Procurement methods that integrate the contractor at the early stages of the planning process such as design-build and partnering, eases collaboration and communication between

the major players and results in reducing tension and having a motivated contractor with a strong membership identity and commitment towards the innovation.

- Zone 4 includes the implementation phase of the innovation process where the developed concept transforms into its practical function. In this stage, the integration of the innovation leader, design team, contractor(s), subcontractors, and supplier(s) is crucial. Stressful situations have to be coped with and managed through maintaining effective communication channels between the different stakeholders. The on-site project manager's role is fundamental during this stage to conduct feedback, improvement, and evaluation meetings, to ensure resources control and allocation, to integrate contractors, and to warrant standards and quality.

After identifying these zones and the most important stakeholders in each zone, and evaluating the main conceptual model that proposes the major aspects that need to be taken into consideration to achieve a successful integration, and consequently, an effective innovation outcome, a number of implications that could guide construction projects to develop strategies that enhance the effectiveness of the innovation are presented below.

- The client/owner's interest, demand, and willingness are determinants for sustainable innovation. This interest can increase as a result of their understanding of different aspects of sustainable innovation. Therefore, having a knowledge base about sustainable innovation prior to designing the project is vital. This can be enhanced by integrating research at the initial phase of the project lifecycle and the innovation process, which this research identifies as zone 1 of integration across the project lifecycle.

- For construction projects to achieve better innovation outcomes, setting clear goals is vital. The lack of adequate knowledge for developing a project brief with clear targets is a hindrance to the sustainable innovation. The client should make decisions and set project goals before selecting a site and the design work. It is recommended to compose a professional team including the owner, design personnel, researchers, and a contractor to assist the client in defining goals and priorities in Zone 1. By doing this, the need to make significant changes and latitude for poor decision-making is reduced leading to greater cost control during the other phases of the project lifecycle.

- The client's/owner's leadership should be enhanced to achieve successful innovations, through
    - Building robust relationships with stakeholders and improving coordination, collaboration and knowledge flows among them;
    - Integration of project experiences into continuous business processes to limit the loss of tacit knowledge between projects;
    - Promoting innovative procurement systems, including partnering or alliancing, to enhance cooperative problem solving, the adoption of non-standard solutions, and equitable allocation of risk;
    - Strengthening of performance-based regulations and standards, through the enhancement of technical knowledge held by regulators and other key players, and through the formulation of simple

enforcement strategies;

- Developing a culture supportive of innovation, enhancing technical competence, supporting innovation champions, and developing an effective innovation strategy.

- Whenever possible, there should be a shift from competitive tendering to partnering and/or alliancing (between the client and the contractor). In addition, those in a position to innovate need to be rewarded for taking such risks. If they are rewarded, they will be incentivized both to adopt new ideas from outside the project boundaries, and to capture the learning from problem solving to propose to the client better ways of doing things. Partnering has to be associated with the use of a range of tools, including charters, workshops, team-building exercises, dispute resolution mechanisms, benchmarking, total quality management, and business process mapping. This relationship management technique develops stronger flows of knowledge between stakeholders and reduces the reluctance of individuals to propose and adopt non-standard solutions. These steps have to be carefully planned for in Zone 2.

- Project owners should selectively appoint an innovation-oriented leader that can successfully integrate the right stakeholders at the right time in the project lifecycle and develop an innovative team with strong identity and membership. This step has to be considered in Zone 1 and implemented in Zone 2. In particular, project owners should focus on cultivating the following traits in their leaders:

- Expressing and communicating a vision for the future;
- Successfully exploiting and transforming creative ideas into innovative solutions;
- Constantly seeking out and promoting new ideas;
- Encouraging and stimulating new ideas;
- Assigning interested and capable team members;
- Listening to and understanding team members' problems;
- Showing appreciation for creativity and hard work;
- Recognising team members' potential and contributions;
- Regularly seeking knowledge of stakeholders and their needs and demands;
- Facilitating interactions among stakeholders and team members; and
- Adapting to stakeholders' behaviour when possible.

- Apart from urging project owners to assign the right leader, this study provides leaders with techniques that they should focus on for fostering innovative team members and stakeholders, since they play a key role in leading the way to effective innovation. In particular, managers/ supervisors should ensure that:
    - Achievable and realistic goals are set and are comprehended and clear among all team members;
    - Adequate time and resources are given for members to explore new ideas;
    - All team members work together to develop new ideas;
    - The exchange of information, internally and externally, is fostered;

- A sense of togetherness and membership can be perceived among team members;
- Team weaknesses are addressed and appraised;
- Individualized support from the leader is provided to all team members;
- Stakeholders are well integrated and their demands are taken into consideration;
- External stakeholders that are part of the innovation team are integrated with the internal team members and both work together collaboratively;

- To ensure the effectiveness of the innovation in a project setting, the owner is urged to hire a leader that understands and is interested in the specific type of innovation that the project is aiming to achieve. For instance, if the innovation is targeted to be sustainable, hiring leaders and team members have to take their personal interest in sustainability into consideration as this research reveals that interest in innovation highly influences the ability of all of the innovation team members, including stakeholders and leaders, to achieve effective innovations.
- Innovation effectiveness should be measured with respect to innovation objectives, without being limited to standard project management performance criteria. Much of the innovation focus revealed by the case studies is environmental sustainability. Therefore, innovation effectiveness should include measures related to environmental drivers, just as other project objectives. For example, reduction in waste, energy consumption, and carbon emission should be considered to be significant measures of innovation, just as

much as reductions in cost and duration. In addition, the wider impacts on project participants should be taken into account when assessing the success of innovation. Contribution to local life and knowledge/experience acquisition are important indicators of the long-term success of the innovation.

8.3 Research limitations

Although this research builds on a rigorous methodology and data analysis procedures, it is still limited to several factors discussed in the following points, which opens doors to making further improvements and future research:

- The study did not consider the ‘time’ factor, which obviously is an important factor to consider in studying the model constructs at different points of the project lifecycle.

- The use of self-reported measures means that the responses still have an element of subjectivity. This is acceptable for measuring ambiguous constructs; however, financial performance is ideally measured by objective metrics. Future research should attempt to seek objective information from firms’ financial reports in order to complement the more subjective measures of innovation effectiveness.

- To the best of the researcher’s knowledge, this research study is the first to link the social identity theory with construction projects’ teams; therefore, the researcher used the major dimensions that reflect group level team identity and individual level team identity as they are available in the literature. Since all of them were reflected on by at least 2 case studies, the researcher took the decision to keep them all, however, more specific research can focus on studying these dimensions in a construction project context to judge whether some of the dimensions need to be weighted or combined with other dimensions.

- The qualitative methodology adopted for this research has strengths and weaknesses as pointed out in chapter four. So, while the combination of three different qualitative methods and a strong validation research strategy have been argued to be sufficient for this research, it is acknowledged that deployment of quantitative methods may reduce the degree of subjectivity that is inherent to these qualitative case studies.

- Other researchers have completed comprehensive studies establishing the links between organizational culture and climate, and innovation. Since the research in this thesis focuses on the project level rather than the organizational level, this element was overlooked.

- The sampling frame of the case studies is limited to Dubai, UAE, to minimize time and the cost of travel. The sample drawn from this domain is considered adequate, as the city is an emerging market for sustainable innovations in construction. A geographically constrained sample might not represent the entire construction industry but it is sufficient to verify the developed conceptual model, which is one of the main objectives of the research.

8.4 Recommendations for future research

After investigating the effect of stakeholder integration on open innovation effectiveness in the construction sector, a significant number of future research opportunities were recognised, including the following:

- Future research should employ a longitudinal research design whereby the study is conducted at different points in time in order to better assess the relationships between the model constructs.

- Future research could focus on studying stakeholder integration techniques to facilitate the development of a strong innovation team identity and achieve effective innovations.

- More specific research could focus on studying the individual and group level team identity dimensions in a construction project context to judge whether some of the dimensions need to be weighted or combined with other dimensions and produce coherent measurable dimensions that are construction context specific.

- Future research may adopt the empirical model developed herein to conduct a comparative analysis between projects operating in Dubai and those in other cities. The results may shed additional light on how cultural differences affect innovation as well as its innovation-related outcomes.

- Future studies may investigate the concept of culture and climate at the project level and link it to the model proposed and presented in this thesis.

- Future research could test the conceptual model with a quantitative method to reduce the subjectivity of the qualitative nature of this research.

- The exogenous factor "interest in innovation" that was recognised through the inductive content analysis and found to be affecting the endogenous factors, should be further studied and categorised to produce measurable dimensions.

8.5 Concluding remark

This chapter has summarised the research endeavour- its main findings, contributions, and limitations- and provided recommendations for further work. It has also argue that this research has achieved its main aim and objectives, which is studying the influence of stakeholder integration on the effectiveness of open innovation in construction projects through proposing a validated conceptual model. The model was developed through the findings of a comprehensive literature review and synthesis and a qualitative methodology using three case studies. Underpinned by the research findings, this study sheds additional light on the innovation and stakeholder management research arena by providing empirical evidence regarding the relationships between leadership for innovation, stakeholder integration, team identity, as well as their contributions to the effectiveness of innovation in an open construction project context. In addition, the study also provided practical implications for the construction sector by offering a model depicting pathways that explain ways for enhancing innovation effectiveness through better leadership, stakeholder integration and team identity. The model could potentially serve as a framework for projects seeking to diagnose and improve their existing innovations. Finally, this dissertation closes with recommended future research directions, which paved the way for other researchers willing to enhance and extend the current findings of this research study.

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Appendix 1

Informed Consent Form

Information and Purpose: The research, for which you are being asked to participate in, is a PhD research study that is focused on examining the effect of stakeholder integration on the effectiveness of innovation in construction projects. The purpose of this study is to gain a better understanding of how the management style and the integration of stakeholders plays a role in the team's phycology towards the innovation project and how it influences the effectiveness of the project.

Your Participation: Your participation in this study will consist of allowing 'Shaima AlHarmoodi' a PhD researcher at the British University in Dubai (BUiD) to use your project as a case study and to allow the researcher to conduct interviews with the management and the team members to gain information that serve the purpose of the research. Each interview will last approximately 20-30 minutes. You will be asked questions regarding the project, the stakeholders, the management and the team members. You are not required to answer the questions. You may pass on any question that makes you feel uncomfortable. At any time you may notify the researcher that you would like to stop the interview and your participation in the study. There is no penalty for discontinuing participation.

Benefits and Risks: The benefit of your participation is to contribute information to the construction, project management, and innovation fields. This may play a vital role in raising the awareness of innovation in the construction sector and providing assistance to the entities that seek to diagnose the condition of their innovative practices. It will also offer many implications that can guide firms to strategize innovation and ultimately improve their business performance.
There are no risks associated with participating in the study.

Confidentiality: The interviews will be audio-recorded, however, your name will not be recorded. Your name and identifying information will not be associated with any part of the written report of the research. All of your information and interview responses will be kept confidential. The researcher will not share your individual responses with anyone other than the research supervisor.

By signing below, I volunteer to participate in a research study carried out by Ms. Shaima AlHarmoodi, a student in the British University in Dubai (BUiD).

If you have any issue concerning this study, you can contact the researcher directly through email (120009@student.buid.ac.ae) or phone number (055-7700223).

Participant Name:

Participant Signature:

Date:

Appendix 2

Interview Code of Conduct

Thank you for your voluntary participation in this interview. This research attempts to investigate the effect of stakeholder integration on sustainable innovation effectiveness in the construction sector.

Please note:

1) The interview shall last approximately 45 minutes.
2) The researcher will take notes of your answers during the interview.
3) The interview will be audio taped. The recorded audio to be used only by the researcher during the interpretation process.
4) All the information will be considered as a highly confidential and will only be used for the purpose on this research study.

You have all the right to withdraw from the interview at any time without any consequences.

Participant Signature: **Date:**

Reasearcher Signature: **Date:**

Appendix 3

Interview Guide

Construct	Leaders and top managers	Team
Open innovation		
Inward IP licensing and External participation		
Outsourcing R&D and external networking		
Customer involvement		
Employee involvement		
Venturing		
Outward IP licensing		
Leadership		
Encouraging and stimulating innovation	Who managed developing the plan? How did you motivate the team to innovate?	Were you encouraged and motivated to collaborate? Do you feel passionate about the project? In what way? What encourages you to perform your tasks?
Providing and inspiring vision	How did you develop this idea? How would you improve the project? What skills do you think were the most important to put up the idea and develop such a plan?	What accounts for the success of the project? What do you think of your leader?
Individualized support	How did you motivate the team to achieve the expected goals?	How supportive was the leader?
Teamwork development	How did you motivate the team to achieve the expected goals? Who ensured managing stakeholders, addressing their needs and demands? How do you manage the team?	Who ensured managing stakeholders, addressing their needs and demands? Tell me about you and the team, how did you work together to achieve the projects goal?
Stakeholder integration	How did you manage stakeholders? Do you think involving stakeholders at an early stage results in better outcomes?	How did you deal with the different stakeholders? Could you explain how the management has dealt with the different stakeholders?

Stakeholder integration		
Knowledge of stakeholders	Did you use any specific mechanism to identify stakeholders and manage them? What was it?	Did you have any previous experience with the different stakeholders that you dealt with?
Stakeholders interactions	What challenges did you face while dealing with stakeholders? How did you facilitate communication and collaboration among them?	What kind of challenges did you face while dealing with stakeholders? How supportive of the innovation stakeholders were?
Behaviours adaptation	How do you manage stakeholders' needs and demands?	How do you manage stakeholders' needs and demands?
Team Identity		
Team level:		
Boundary clarity		
Boundary permeability		
Cohesion		
Common language and understanding		
Cooperative working atmosphere		
Cognitive similarity		
Individual level:		
Self-categorization		
Evaluation		
Importance		
Attachment and sense of interdependence		
Social embeddedness		
Behavioural involvement		
Content and meaning		
Innovation effectiveness		
Future/expected innovation potential		
Effective/efficient innovation capacity		

Appendix 4

Demographic information

Interviewee number	Type of stakeholder	Position	Education level
1	Leader	Founder/CEO	Graduate
2	Others	Education project manager	Graduate
3	Design team	Design manager	Graduate
4	Design team	Sustainability Engineer	Graduate
5	Design team	Sustainability civil Engineer	Graduate
6	Others	CRM	Graduate
7	Others	operations officer	Graduate
8	Leader	CO-founder/SVP	Graduate
9	Contractor	Lead architect	Graduate
10	Contractor	Project director	Graduate
11	Design team	Design manager	Graduate
12	Consultant	Solar Electrical Engineer	Under-Grad
13	Contractor	Mechanical manager	Under-Grad
14	Contractor	Owner	Under-Grad
15	Supplier	Manager	Under-Grad
16	Consultant	CEO	Under-Grad
17	Leader	EVP	Graduate
18	Design team	SVP technical	Under-Grad
19	Design team	Lead architect	Graduate
20	Design team	Senior manager technical	Under-Grad
21	Design team	Senior manager MEP	Graduate
22	Consultant	Senior manager - design	Under-Grad
23	Consultant	Manager of sustainable development	Graduate
24	Consultant	Engineer of environmental sustainability	Graduate
25	Design team	Architect	Under-Grad
26	Consultant	Project manager	Graduate
27	Contractor	Project manager	Graduate
28	Leader	Manager on site	Graduate
29	Contractor	Project manager- contracting	Under-Grad
30	Supplier	Manager	Under-Grad
31	Design team	Project manager-Senior Engineer	Graduate
32	Leader	VP. Engineering	Under-Grad
33	Leader	Project Manager	Graduate
34	Leader	Head of Engineering department	Graduate
35	Consultant	Design consultant	Under-Grad
36	Contractor	Project Manager-Contracting	Under-Grad
37	Design team	Engineer	Under-Grad
38	Design team	Architect	Under-Grad

Appendix 5

Example of observation notes

Field visit #1				
Observer: Shaima AlHarmoodi	**Case1: SC**	**Location: Head office**	**Date: 26-08-2015**	**Time: 11:00 am- 3:00 pm**
I had a meeting with Mr FS at 11:00 am in the morning at their head office. I entered the head office, which looked very calm and quiet. There is a huge prototype of the project in the middle of the entrance hall. It looks very attractive. The office is white and refreshing with greeneries at every corner. The PA welcomed me with a warm smile and asked me to have a seat. After a minute, she asked me to enter Mr FS's office. His office is huge with different pictures of the progress of the project and some other artistic paintings. He welcomed me gladly and asked me to have a seat. He asked me about my background and my interests in sustainability and innovation. He said: "I am glad that there are Emirati young ladies like you pursuing their studies and adding to knowledge." Then he added, "The construction sector obviously needs that." He continued by saying, "Education and research is always important in every aspect in life, if we keep what we always do without improving or innovating, we will be very limited in our choices." Then we started conducting the interview. He was very welcoming and answered my questions in depth without hesitation. The interview was interrupted by a phone call, he apologized and took it but he hang quickly apologizing to them and saying, "I have an important interview, I will call you back later." When we finished the interview, he introduced me to A, a manager in the office that handles dealing with educational institutions. He welcomed her and said that she is very smart and talented. She smiled back and welcomed me. Then he introduced me to the design manager with a smile that showed how proud he is of her and said "This is one of our first Architects in the project, without her, this project will not be as good as it is now." "I am very proud of her." Then he showed me the different sections of the office that are very proximate from each other, the glass front walls makes them feel even closer. Then he showed me the prototype and started explaining the different phases and the sustainable innovations they used in the project. "We were inspired by the old neighbourhoods of Dubai and the house of the former ruler of Dubai. The old neighbourhood was sustainable." He was interrupted by another call and he excused himself and went to his office. I stayed in the hallway for a while, it was quiet, I noticed some employees pass by others to greet them, some to finish some paper work, others to take an opinion. Then it was lunchtime. I noticed a couple of employees going down to a café next door to have food. I followed them later and sat on a table close to them. They did not notice me, I was still not very familiar. They were chatting and laughing, they seemed happy. When they wanted to leave, one of them noticed me, he came over and said, "why didn't you join us?" then we had a chat together, he is the sustainability engineer M, a very friendly and passionate young man. He asked me about my background and my research and then he talked about himself. He said, "I was lucky to know some people that know Mr FS and told me about the project, I immediately applied because I really have a personal passion towards sustainable development." Then his colleague, the design manager, told me about her story when she joined SC. Her husband is a friend of M, they met once and she mentioned that she is looking for a job when he told her about the SC, she immediately applied as well because she was very excited about the idea and wanted to experience to work as an architect for a developer not a consultant. They were very friendly. When we went back to the office, It was calm again and I had to leave.				

Appendix 6

Example of coded interview transcript using NVivo