The Generated Business Value from IT: the Case of Fostering Organizational Innovation

عوائد تكنولوجيا المعلومات: دراسة لمدى قدرة تكنولوجيا المعلومات في دعم وتطوير الإبداع المؤسسي

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Abstract

The difficult situations that emerged during the economic downturn over the recent years put an increasing pressure on executives to create more value from IT, as a significant amount of money is being allocated to IT. This was a plausible reason for shifting IT from a supporting function that facilitates business work and automates it to a fundamental player in driving business development and growth. This dissertation is undertaken to study how organizations can maximize the return value from their investment in IT, and what are the significant benefits that organizations can obtain from IT to make their business grow. Then the dissertation focuses into one business benefit which is fostering organizational innovation. Accordingly, this study aims to examine the role of IT-based knowledge management systems in triggering and supporting business innovation, in addition, it aims examining the role of enterprise management information systems in developing innovative business practices. Research for this study included a review of current literature on the returned business value from investing in IT capabilities, as well as reviewing the literature in organizational innovation and its practices. The research also included five case studies each done by interviewing number of senior IT staff, working at these cases. The major findings revealed that there were indeed number of knowledge management practices that used and helped organizations in triggering and supporting business innovations, as well the enterprise information systems had the ability to introduce innovative business practices like innovative processes. The conclusion suggests that there were significant business benefits that could be generated from investing in IT, including fostering organizational innovation, but there was an inadequate exploitation for some of these benefits. Therefore, the study recommends exploiting the benefits by more integrative work across-functional business units and to use the latest advances in IT to communicate and collaborate to diffuse the knowledge that can be applied in business innovations.

ملخص عام:

إن الظروف الصعبة التي نشأت بسبب الأزمة المالية خلال السنوات الأخيرة قد وضعت المدراء والتنفيذيين في ضغوط متزايدة للاستفادة القصوى من تكنولوجيا المعلومات، خصوصا أنه يستحوذ على جزء كبير من الموازنة المالية للمؤسسات. فمن هنا كان منطقيا أن يتم التوجه لتمكين تكنولوجيا المعلومات من أن يقوم بدور أكبر في قيادة المؤسسات نحو مزيد من النمو والتطور والإبداع بدلا من أن يقتصر دوره على تسهيل إجراء العمليات وأتمتتها في تلك المؤسسات فحسب.

بناء على ذلك، قامت هذه الدراسة بالبحث في العناصر التي قد تؤدي إلى المنفعة القصوى من الاستثمار في تكنولوجيا المعلومات و التي قد تمكن المؤسسات إلى مزيد من النمو و التطور و الإبداع. فلقد تم في هذه الدراسة استعراض دور أنظمة و برمجيات إدارة المعرفة في دعم و تسهيل الإبداع في المؤسسات، بالإضافة إلى استعراض دور أنظمة المعلومات الإدارية في خلق ممارسات عمل إبداعية و التي قد تكون سببا في مزيد من الإنتاجية و زيادة رضا العملاء.
و لتحقيق ذلك تم دراسة خمس مؤسسات في دولة الإمارات العربية المتحدة و تم مقابلة أشخاص يعملون في قطاع تكنولوجيا المعلومات ضمن تلك المؤسسات للتعرف على الفوائد المرجوة من تقنية المعلومات و فيما إذا كان هنالك دور بارز له في عملية الإبداع ضمن تلك المؤسسات.

بخصوص النتائج التي خلصت إليها هذه الدراسة، قد تم عرض عدة فوائد تم اكتسابها من الاستخدام الأمثل لتكنولوجيا المعلومات مثل تعزيز جودة العمل، زيادة رضا الزبائن، تقليل الوقت اللازم لإنجاز بعض المهام، بالإضافة إلى قدرة تكنولوجيا المعلومات على تطوير مبادرات إبداعية. لكن النتائج عكست مستوى متواضعا من استخدام انظمة متكاملة لإدارة المعرفة، إلا أنها اشارت إلى عدد من تطبيقات إدارة المعرفة و التي تم استخدامها لدعم و تطوير الإبداع مثل انظمة الاقتراحات الالكترونية، شبكات التواصل الاجتماعي، الاشتراكات الالكترونية مع شركات استشارات عالمية، بالإضافة إلى بعض الأدوات مثل: Share Point, Portals, and online collaboration.
كذلك تم التوصل إلى أن قدرة أنظمة المعلومات الإدارية في خلق ممارسات عمل إبداعية كان من خلال إعادة هيكلة العمليات و اقتراح نماذج عمل ابتكارية قائمة على اقتراح طرق جديدة للعمل أو بالاعتماد على انظمة معلومات مترابطة فيما بينها أو مترابطة مع وسائط تقنية و التي لم تكن

لتحصل لولا تكنولوجيا المعلومات مثل الخدمات الشاملة أو خدمة النافذة الواحدة إضافة إلى الخدمات المقدمة عن طريق الهواتف الذكية والخدمات الالكترونية الذاتية التي أصبحت تنجز من خلال الانترنت. علاوة على ذلك أشارت الدراسة إلى الحاجة للاهتمام بتحليل البيانات التي تم تخزينها ضمن أنظمة المعلومات لمساعدة المؤسسات في عملية التطور و الإبداع.

من أجل تحقيق الفوائد و التي من الممكن اكتسابها من تكنولوجيا المعلومات أوصت الدراسة بعدة أمور منها: التعامل مع مشاريع تكنولوجيا المعلومات على أنها مبادرات تغيير مؤسسي و ليس مشاريع تقنية فقط. و هذا يتطلب أن تغير المؤسسات من ثقافتها لاحتضان التغيير و الإبداع و التي قد تأتي به هذه المشاريع. كما أوصت الدراسة باستخدام تقنيات التواصل الحديثة لأنها توفر طرق سهلة و مرنة في تبادل المعلومات و الأفكار لاستخدامها في تطوير الإبداع وخاصة مع الزبائن والخبراء أو المتمرسين في مجال معين. كذلك أوصت هذه الدراسة بإنشاء وحده إدارية أو فريق عمل يعمل على مستوى المؤسسة ككل لاقتراح مبادرات إبداعية يشترك بها عدة أقسام و هذا الفريق يكون لديه مهارات في إدارة المشاريع، الجودة، إدارة التغيير، تطوير الإبداع، هيكلة العمليات و تحسينها و تبسيطها.

و أخيرا، استخلصت الدراسة على أن هنالك توجه نحو تمكين تكنولوجيا المعلومات للعب دور بارز في خلق فرص جديدة من أجل تطوير عمل المؤسسات، إلا أن ذلك يستدعي استثمارا رشيدا في تكنولوجيا المعلومات و تدريب و تطوير العاملين في هذا المجال، علاوة على تغيير النظرة التقليدية عن تكنولوجيا المعلومات و المقتصرة على حوسبة العمليات.

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Chapter One: Introduction

1.1 Background

In recent years, organizations are increasingly facing difficult situations because of the economic turbulences caused by the economic crisis, which results in a high level of competition. These undeniable difficult situations coincide simultaneously with continuous developments in the field of information technology that burden organizations with immense expenditures that are required to develop new IT advances. To take the extra benefit from the huge investments in these advances, many organizations speculate about how to maximize the obtained business value from these investments to face the severe competition and to create increasing economic growth.

At the same time, The United Arab Emirates (UAE) has an advanced position in both global competitiveness index (The Global Competitiveness Report, 2009-2010) and Information and Communication Technology (ICT) index (World Bank, 2008 and 2009) which shows the UAE has the highest rank in the ICT index and the second highest rank in the competitiveness index among Middle Eastern countries. Additionally, the Arab Knowledge Report (2009, p.175) encourages the use of ICT applications in Arab countries because it is anticipated to bring about fundamental and wide-ranging social and economical effects as ICT is considered one of the main pillars, besides innovation, education and infrastructure, that constitute the knowledge economy.

Accordingly, to capitalize on such a high position of the UAE competences, and to utilize the great benefits that IT can offer to businesses, this research is undertaken to investigate how to create and enhance business value from IT investment through utilizing the benefits of the significant rise of the capabilities of information technology. In particular, late advances in the technology like the internet, web technologies, knowledge management systems, Enterprise Resource Planning (ERP) systems, Customer Relationships Management (CRM) systems beside other IT infrastructure tools, are making organizations more able

to develop new initiatives that can bring significant advantages to organizations including fostering organizational innovation in competitive environment.

1.2 Aims and Objectives

Generally, the purpose of this dissertation is to investigate the business value obtained from investments in IT capabilities. Then the dissertation becomes more focused on exploring the IT role in enhancing the organization's capabilities in organizational innovation. The research will involve specific IT capabilities and explores how these capabilities can foster organizational innovation.

This study will specifically examine how knowledge management systems enabled innovation through gathering and storing different ideas and knowledge to provide a knowledge base that can be shared by different parties who are interested in developing new initiatives. This study will also examine whether enterprise management information systems can lead process-driven innovation and how.

The dissertation objectives are:

1. Investigate the potential benefits of investment in IT in creating and maximizing business value.

2. Examine the role of knowledge management systems in triggering and supporting innovation development

3. Examine the role of enterprise management information systems in reengineering existing business processes and providing innovative business practices

Figure 1.1 shows the research motive that aims to investigate the potential benefits of investment in IT and how to exploit these benefits.

IT Investment **Potential Benefits**

Effective Use of
IT Capabilities

Generating
Business Value
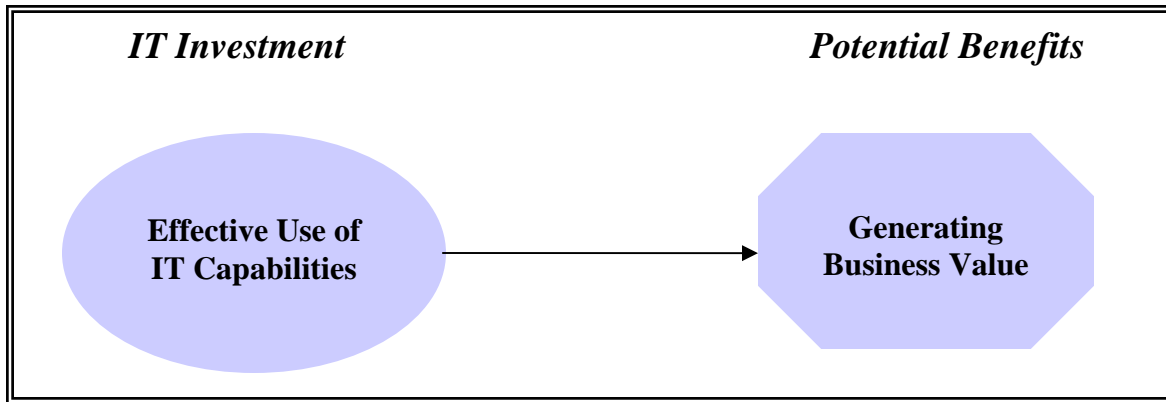
Figure 1.1: The Research Motive

1.3 Research Questions

The main question that this research aims to answer is:

RQ: How can the UAE firms benefit from their investment in IT capabilities to foster organizational innovation?

This research question can be answered by dividing it to sub questions like:

RQ1: What are the potential benefits from IT investment? Are the UAE organizations effectively using IT to foster innovation?

RQ2: How can knowledge management systems be used to effectively support and trigger business innovation?

RQ3: How can enterprise management information systems be used to effectively provide innovative business practices?

1.4 The Importance of the Study

This dissertation should be able to assist senior IT specialists, IT managers and IT strategists to design their IT strategic plans based on the expected benefits from IT investments, and to leverage the role of IT to play an effective role in achieving the organizational business strategies. Moreover, as the Google's chief

economist, Varian (2009) indicates that the leaders in contemporary organizations really need a clearer understanding of how technology empowers innovation. Therefore, this dissertation will also present guidelines to IT professionals about the IT role in supporting and triggering innovational initiatives within organizations, by providing better understanding about specific IT capabilities and their effective roles in enabling the organizational innovation.

1.5 Dissertation Structure

This dissertation is equipped within six chapters. Chapter one provides an introduction about the dissertation including the background, the importance of the study and the dissertation objectives and questions. Literature review in chapter two explores the debate in the realized business benefits from IT including productivity, strategic benefits and fostering organizational innovation. Chapter three goes on in literature review to discuss number of IT capabilities that play effective role in organizational innovation which are knowledge management systems and enterprise management information systems along with other IT infrastructure tools that facilitate innovation development. In the same chapter; three; further detailed exploration is provided about how these specific capabilities play effective role in organizational innovations, which altogether will formulate the theoretical framework for the study. Chapter four provides the research methodology that has been suggested to undertake the research, with the justification of the selected methods. In chapter five, the results obtained from different case studies are shown and then they are analyzed to reflect the relation between the collected data and what have been discussed in the literature. The final chapter; chapter six; presents the study conclusion and set of recommendations that are suggested to those organizations that aim to maximize the returned value from their investment in IT. This structure can be clearly shown in the Figure 1.2.

Introduction - (Chapter 1)
- Background
- Importance of the study
- Aim and Objectives & Research Questions

Literature Review - The Generated Business Value from IT Investment- (Ch 2)
- Productivity Benefits
- Strategic Benefits including Org. Innovation
- Different Frameworks that show how IT can provide business benefits
- Why and how can IT enable Organizational Innovation?

Literature Review - IT Capabilities and their Role in Innovation - (Chapter 3)
- **IT capabilities that trigger and support innovation**
   - Role of Knowledge Management Systems including knowledge collection & sharing
   - Role of IT tools including communication, collaboration and designing tools.
   - Role of IT capabilities in supporting an innovation process (knowledge brokering)
- **IT capabilities that provide innovative business practices**
   - Role of Enterprise Information Systems in providing innovative business processes
   - Role of Data Analytics in providing innovative business practices

The Research Methodology - (Chapter 4)
- How the dissertation was conducted (the research design)
- Choosing research approach and method
- How the empirical data was collected and then analyzed
- Mapping of the research questions with the suggested hypotheses
- Methodology Critique

Results Findings & Discussion - (Chapter 5)

- Cross-Case data results
- Findings discussion

Conclusion and Recommendations - (Chapter 6)
- Study Conclusion
- Study Recommendations
- Study Limitation and Further Research

Figure 1.2 - The Research Structure

Chapter Two: The Generated Business Value from Investing in IT

2.1 Introduction

Over the last three decades, there has been an extensive argument about information technology (IT) and its impact on the organizational performance and to what extent the huge investment in IT can create business value for organizations. This discussion was rooted in the literature since 1980s when there was a huge investment in IT without any remarkable economic impact. Initially, this negative relationship between IT investment and its resulted returned value called by Nobel Laureate in economics, Solow (1987), as "Productivity Paradox" who states, "you can see the computer age everywhere but in the productivity statistics" (cited in Hagemann 2008, p. 60). Since that time, many researchers have become more motivated to study the effect of IT in organizational performance and interestingly, different results and findings have been discovered by different researchers.

Furthermore, in one of the Harvard Business Review articles, "IT does not matter", Carr's work findings (2003) created extensive debate about the obtained value from IT investment, when he considered IT as not more than infrastructure or commodity to organizations. Before that, a few authors (Clegg *et al.* 1997; Sweeny 1996) claimed that the value from the high investment in IT cannot affect appropriately the organizational performance. On the other side several studies (Brynjolfsson and Hitt 2000 and 2002; Devaraj and Kohli 2002 and 2004 ; Dedrick *et al.* 2003 ; Peppard and Ward 2005 and 2007; Tallon *et al.* 2000 ; Tallon, 2007 & McAfee and Brynjolfsson 2008) argue that investment in IT is more valuable and can provide significant advantages to the firm's performance in different conditions and aspects based on the factors and variables that have been examined in each research. Based on the above arguments this research assumes IT can create business value for organizations when certain IT capabilities play effective role in enabling the organizational innovation.

However, these different views support the "productivity paradox" and this part in this research focuses to explore these different views deeply and will consult the literature to understand the link between IT and organizational innovation.

Thereby, conducting such literature review is essential to clarify the IT role in providing significant business benefits to organizations especially fostering organizational innovation. As a result of conducting this literature argument the first research question that this study aims to answer becomes more clearly addressed.

2.2 Productivity as a Returned Business Benefit

The investigation about the returned business value from investment in IT shows contradicting results from many of researchers who either just reviewed the literature or conducted empirical research on this area.

Brynjolfsson and his colleagues, Hitt and Yang, in consequent and integrative work (1996, 1998, 2000 & 2003) dispute the "productivity paradox" and show a positive link between IT investment and its returns. To find such outcomes, they have reviewed about hundreds of articles besides conducting empirical research. This was done to clarify the principles of IT investment and its impact, by measuring the IT investment as well as the profit before and after IT investment over many years. They accurately indicate the researchers who find there is null or negative relationship between IT investment and its returns, build their arguments based on productivity growth and financial returns. They continue to argue that measuring financial returns of IT is very difficult and a complicated job, in addition to that, generating financial returns from IT investment needs a considered period of time to show positive results. Most importantly, Brynjolfsson and Hitt (2000) demonstrate that a significant outcome value of an IT investment is its ability to enable complementary changes in business processes and work practices of firms. That emerged complementary changes may results in positive productivity impacts like reducing costs or improving intangible aspects of existing products and services, such as reducing the cycle time, enhancing quality and customer service. Furthermore, Brynjolfsson and Hitt (2000 & 2003)

point out that, productivity factors that IT can enhance are significantly higher when measured over long periods, simply because long-term returns emerged from the accumulated effects of related investments in organizational changes.

Based on the above results that provide evidence about the positive impact of IT on the organizational performance, several researchers who also refute the "productivity paradox" and support Brynjolfsson and his colleagues' findings, examine different complementary practices that can be combined with the IT initiatives to provide enhanced performance and significant business value. Authors like Devaraj and Kohli (2002 and 2004) and Dedrick *et al.* (2003) accurately believe IT is not simply a tool for automating existing business processes, but it is a highly essential enabler of organizational changes like decentralized decision making, job training, business process reengineering and e-commerce beside other valuable business practices that can guide organizations toward further business productivity. Thereby these studies conclude that complementary business practices jointly with many IT capabilities have a major impact on financial returns and can lead to further gains.

Other complementary business practices are suggested by Tallon *et al.* (2000) and Tallon (2007) who show that the IT investment solely is not enough to generate business value to organizations, and the organizational performance is remarkably enhanced when the implemented IT initiatives are highly aligned with the business strategy. Further to that, Tallon (2007), named the current period as "post-productivity paradox era", where the question is how to maximize the value from IT not if there is a returned value from IT. Moreover, Tallon *et al.* (2000) demonstrate how different types of business strategy produce different value from IT and they conclude the broad or multi-focused business strategy may lead to more business value from IT, because there is same investment in IT infrastructure that can be shared among many focused strategies that are separated.

2.3 Strategic Business Benefits

Other researchers and authors have shown an interest in other performance approaches, and they have considered that productivity is not the only criteria that can determine if the IT has a positive impact on organizational performance (eg. Peppard and Ward 2005 ; Broadbent *et al.* 2003). Those authors have focused on strategic benefits as a pivotal business value like creating or enhancing competitive advantage, enhancing customer satisfaction and the ability to work as facilitator and supporter to organizational innovation, and certainly, those advanced business practices by the time can enhance the productivity growth. Peppard and Ward (2005, p.26), for example, support this strategic endeavor when they argue "expecting a quick payback is inconsistent with the requirements necessary for successfully building relationships with customers investment must therefore be assessed in this light".

Initially, to discuss strategic issues there is indispensable argument that engages Michael Porter's position, because Porter is one of the popular researchers who conducts research and writes extensively about strategy topics and the competitive advantage. In early times, during his research about the competitive advantage and even before the emerging of the internet and other IT advances, Porter and his colleague, Millar, (1985) assume that "IT can create competitive advantage, by giving companies new ways to outperform their rivals". At that time, they expect the ability of IT in creating completive advantage will continue and will be strengthen because the cost of storing the huge amount of information, analyzing and processing, and transmission are falling quickly and the horizon of what can be achieved by exploiting that information is at the same time expanding. From this assumption, it seems the authors view IT as having the ability to process information and enhance business processes and not from technology acquisition and adoption perspective. This is because same author, Porter, in later study and after emergence of the internet, Porter (2001, p.65) established that "internet technology provides better opportunities for companies

to establish distinctive strategic positions than did previous generations of information technology", but the internet itself is not considered as a strategy if you don't have distinctive strategic position. On the other hand, when you have a strategic position and you complement it with other integrated value chain activity, which is serving it by the internet, at that time you will have sustainable competitive advantage, which will be difficult for any competitor to replicate or imitate the full company's activities that fit together as one system (Porter 2001).

When Carr (2003) presented his controversial claim and published his article "IT does not matter", many authors (Brown and Hagel III ; Broadbent *et al.* ; Strassmann) responded promptly and those responses published in an article called "Does IT Matter?" in the HBR in same year 2003. Carr's argument was that IT cannot create significant value for organizations and cannot create competitive advantage and the IT executives should focus on avoiding risks, to "follow not to lead" as most of IT infrastructure do the same job so IT executives should spend less. Carr considered IT is like any commodity to organizations because anyone can buy a hardware machine or even a ready-made software package so it is replicable and thereby it cannot create competitive advantage for organizations. In other words, Carr (2003, p.10) clearly reported, "Studies of corporate IT spending consistently show that greater expenditures rarely translate into superior financial results. In fact, the opposite is usually true".

The responses to Carr were more convincing and focused on many strategic benefits that IT can provide, like creating competitive advantage and enhancing the incremental innovations that over time leads to differentiation. For example Brown and Hagel III (2003, p.3), who present a close view with the findings of previous authors like Brynjolfsson and his colleagues by highlighting that, "the strategic impact of IT investment comes from the cumulative effect of sustained initiatives to innovate business practices in the near term". To illustrate this, installing new hardware device or new application software like enterprise resource planning (ERP) system or customer relationship management (CRM)

system without changing business practices and without exploiting its underlying strong capabilities, it will destroy the IT economic value and unfortunately this is the case for many organizations and because of this, many empirical research findings claim about negative impact of IT on financial results (Brown and Hagel III, 2003). The latter continue to say changing business practices creates unintended consequences by "chunking up" innovations in business practices and this incremental innovations ensure its business return with reduced risks because big bang IT-driven initiatives rarely result in expected returns and usually have high potential risks.

And even the IT business value come from near term innovations still it can create business differentiation as the strategic differentiation emerges through continuous short-term innovations which are accumulated over long period of time (Brown and Hagel III, 2003).

Another constructive response emphasizes, that the benefits from IT investment, can emerge when IT leads innovated practices in organizations. In this regard, Broadbent *et al.* (2003) agree with Carr that IT infrastructure and standard software packages including enterprise information systems are commodity. But, what IT does matter is the intelligent and the innovative application of IT which solves business problems and creates customer value on high speed and low cost, so its not about the box but what is inside the box. Similarly, Strassmann (2003) mentioned competitive advantage is not the result of adopting computer in your work, it is based on how you manage effectively the IT by skilled and motivated people, and he provides evidence that, if two firms bought same technologies the return value from those technologies will not be the same.

However, it can be argued that even these responses are logically persuasive; they are based on theoretical views more than empirical results. For this reason, it is important to shed light on other articulate studies that are based on empirical research, which support the above-mentioned debate and expand it. Peppard and Ward (2004 and 2005) and Peppard *et al.* (2007) try to address the above views. They remind us that, "what is often forgotten is that IT in itself has no

inherent value, so just having a particular system or technology does not automatically confer any value to the business and does not create competitive advantage" (Peppard *et al.* 2007, p.5). The later authors argue that the business value from investing in IT can be achieved when IT makes people more capable to do things differently which requires from organizations to enhance their use of information, and to design new ways for doing the business work through the reengineering of intra- and inter-organizational business processes or providing easier business practices. Consequently, the realized business value is a journey not a destination as it accumulatively occurs over a period of time, and this journey must be actively planned and managed.

In addition to that, Peppard and Ward (2004, p.169) state "the business value derived from IT investments only emerges through business changes and innovations, whether they are product/service innovation, new business models, or change in business processes, and organizations must be able to assimilate this change if value is to be ultimately realized". To do that, same authors follow their discussion in next article (2005) by recommending the organizations to continually work to achieve any benefit identified and this requires the active engagement and involvement of both business management and users to construct a benefits realization plan that have details of the benefits source, responsibilities, making business changes, as well as timescales for achievements. To ensure the obtaining of the expected business value themselves, Peppard and Ward (2005) beside other authors like Markus (2004) and McAfee (2006) stressed that the IT investment can provide great business value when organizations lead the IT project as a business change project and not technology or installation project. Thus, managing such projects according to change management plan can ensure the expected business value.

2.4 Different Approaches that show how IT can provide business benefits

Many of the fore-mentioned authors, who support the view that IT provide valuable business benefit; go further in their research to provide different approaches to show how IT can successfully provide effective business value to organizations. For example, Peppard and Ward (2005) identified two approaches to gain business value: problem-based and innovation-based. The business value is realized from problem-based approach when removing existing problems through new IT means and improved ways of conducting business processes and activities, this problem-based approach is shown in Figure 2.1. Whereas the innovation-based approach, which will be explained in this chapter later, can provide business values when the organizations become more able to identify, create and successfully implement new ways of conducting business.
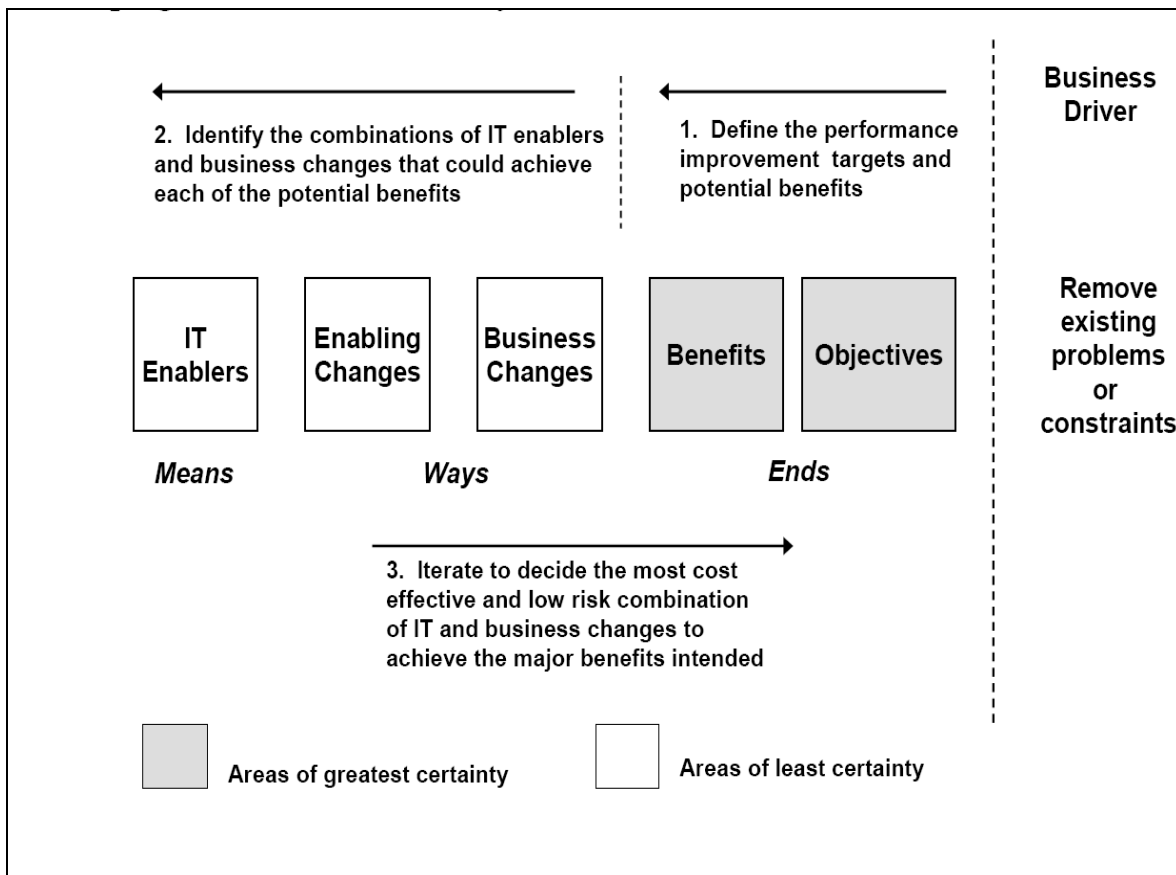
Figure 2.1 – Problem-based Approach to solve Problems using IT ; Source : Peppard & Ward (2007, p.16)

Other established framework is suggested by Kohli and Devaraj (2004), who found IT can add business value at each activity in the value chain by reducing costs, strengthening relationships with business partners, and creating market flexibility. The demonstrated framework is consisted from four phases of the Alignment-Involvement-Analysis-Communication, called (AIAC) framework that starts with investments to create IT assets that are then converted into impacts. The steps of this framework are shown in Figure 2.2.

AIAC Framework With Tools And Techniques Used In Each Step

Alignment	Involvement	Analysis	Communication
Align Business-IT Strategy • Porter's model • Resource Based View	Involve Customers • Joint Application Development • Procurement	Establish Analytics • Cost Benefit • Regression analysis • Production function • Real Options	Make Actionable Steps • 'Back at my desk' • Integrate with existing processes • Industry benchmark
Invest in Complementary Assets • Infrastructure • Training • Marketing • Process redesign	Create Tangible and Intangible • Balanced Score Card – Financial, Quality, Customer service, satisfaction • Actual usage	Validate Results • Commonsense check • Reality check • User review • Reverse validation	Communicate Results • PR support • Town hall meetings • Intranet website • User groups
Choose IT Investment Type • New investment • Maintenance • Upgrade • Prospective	Make the Business Case • Critical Success Factors • Failure analysis	Interpret Results • Plain English interpretation • Extent of the effect • List caveats • Acknowledge unknowns	Institutionalize Payoff Analysis • Project management • Change management • Reward mechanism

Investments → Assets → Impacts

Feedback

Figure 2.2 – AIAC Framework; Source: Kohli and Devaraj, 2004, p.57

In addition to that, Figure 2.3 shows other framework proposed by Huang and Hu (2004) which links IT investment in web technology services with the corporate

competitive strategy using the balanced scorecard performance tool, to ensure aligning the newly developed web services with the corporate strategy that lead as a result to competitive advantage.
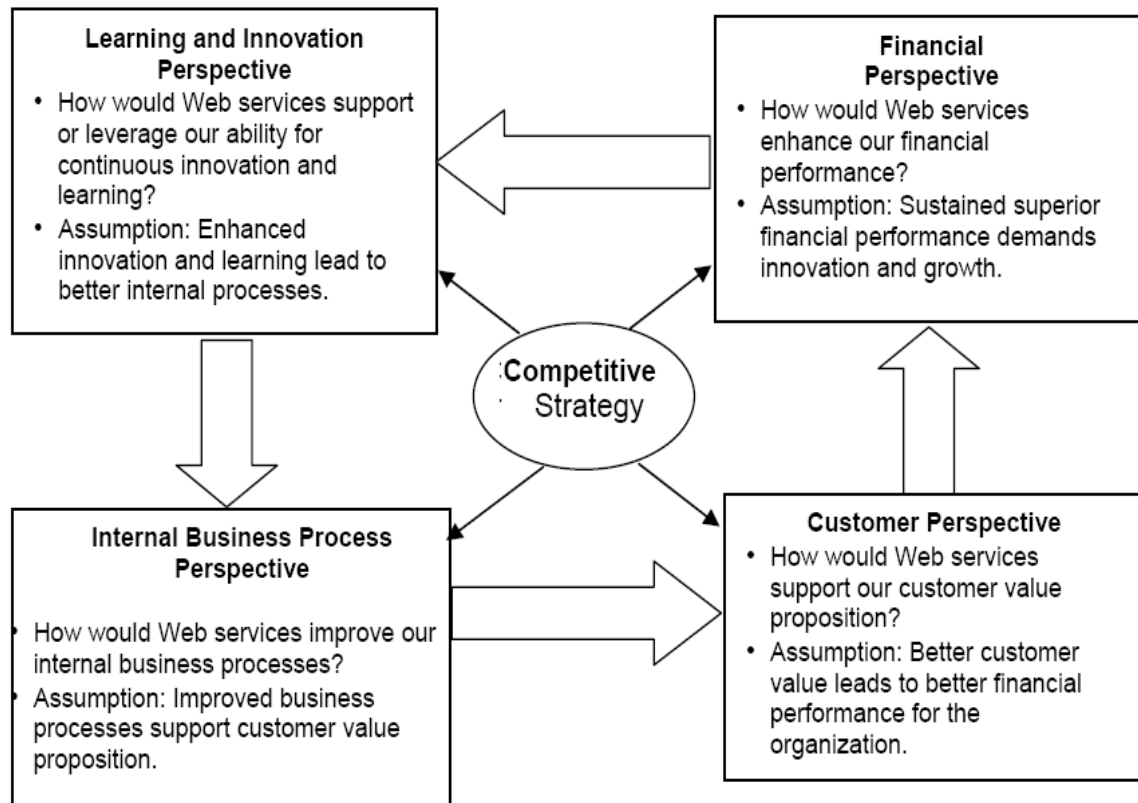
Figure 2.3 Web Service Balanced Scorecard Framework; source (Huang & Hu 2004, p.66)

The authors, (Huang and Hu 2004), assume that investing in development of web services should support the IT strategy that is in turn, should also be driven by the corporate strategy. The aim of using the balanced scorecard concept by Huang and Hu (2004) is to ensure the web services are delivering the expected results, at the same time are enhancing the competitive strategy by multiple perspectives which are the balanced scorecard's four perspectives: financial, learning and innovation, internal business processes and the customer.

To sum up the fore-mentioned argument, it is clear therefore after reviewing the literature that the business value derived from IT investment is realized when it emerges through changing traditional business practices and fostering innovation. To pursue this evidence it is essential to understand deeply how fostering innovation can be considered as a returned business value from IT, and examine in what way IT can drive business toward organizational innovation development.

2.5 Organizational Innovation as a Returned Business Value from Information Technology

At this stage, the study work becomes more narrowed to be focused only on one specific business benefit that is generated from IT, which is enhancing and supporting the organizational innovation. Hence, it is essential firstly to understand what is the organizational innovation, why is it important, and understand why IT! or what is the underlying strong competency that, IT has and, make it capable to play effective role in enhancing and supporting the organizational innovation.

2.5.1 Organizational Innovation

2.5.1.1 Innovation Definition

In the literature, there are many definitions for innovation, but most of the definitions are evolving around the following aspects

- Doing something new or do something in new ways
- Innovation is a process
- Innovation requires new ideas, knowledge and insights
- Innovation introduce changes
- Innovation aims to create customer, economic or commercial value in the market or to improve the business processes

For example, Cash *et al.* (2008, p.92) define "innovation as doing new things that customers ultimately appreciate and value—not only developing new generations of products, services, channels, and customer experience but also conceiving new business processes and models".

On the other hand, Herkema (2003 cited in Plessis 2007, p.21) defines innovation as "a knowledge process aimed at creating new knowledge geared towards the development of commercial and viable solutions. Innovation is a process wherein knowledge is acquired, shared and assimilated with the aim to create new knowledge, which embodies products and services". Herkema (2003) also states that innovation is the adoption of an idea or behavior that is new to the organization, and it can be a new product, a new service or a new technology, and it is related to change, which can be radical or incremental.

At the same time, Plessis (2007, p.21) defines innovation as "the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and to create market driven products and services, and it encompasses both radical and incremental innovation".

It is important also to mention that most business scholars and researchers noticed that innovation does not emerge from an inherent individual brilliance but it comes from a fresh perception (Drucker 2002; Skarzynski and Gibson 2008).

2.5.1.2 Innovation Types

As described in the innovation definition, innovation can be implemented by developing new products, services, processes and business models. As McDonough III *et al.* (2008) mentioned innovation typically is developing new products but there are other areas that make organizations compete upon building innovation capability such as leading-edge technologies, new and better services, lower prices, better operational execution and better understanding of customers and markets. Therefore, there are many types of organizational innovation and here are some of them:

Service Innovation: It is the development of a new service that is perceived as new and helpful to a particular focal audience (Flint *et al.* 2005 ; Grant 1991 cited in Grawe *et al.* 2009, p.283).

Process Innovation: Davenport (1993, p.10) defines the process innovation as" stepping back from a process to inquire into its overall business objective, and then effecting creative and radical change to realize order-of-magnitude improvements in the way that objective is accomplished". He also considered the incremental improvements in efficiency and effectiveness in the business processes are not process innovation, because process innovation involves substantial leap in organizational performance with heavy focus on the customer. For this reason, the organizations that are looking to introduce process innovation should manage such innovation as enterprise organizational change taking into consideration change phases and roles, and many reengineering projects faced troubles because they ignored this consideration (Davenport, 1993). In this type of innovation, Moore (2004) suggests the operation manager to be the team leader who is responsible in managing all implementation phases.

Marketing Innovation: Improving customer-targeting process and enhancing the marketing communications using the web or end user transactions. However, in this innovation type, Moore (2004) suggests the marketing manager to be the team leader who is responsible in managing all implementation phases

2.5.1.3 Why are Innovation and its practices needed?

Many researchers have suggested developing innovative business practices and building distinctive products and services to create and maintain sustainable competitive advantage and to develop economic growth especially in difficult times.

For example, Panayides (2006) suggested that "in an era of rapidly changing technology and highly unpredictable markets, firms should develop and support their innovation capabilities to satisfy market demands and customer preferences in order to maintain a long-term competitive advantage". Whereas Almeida *et al.* (2009, p.35) said, "Innovative practices enable organizations to reorganize themselves, to adapt, to discover new value opportunities and to relate better to other players". The authors, (Almeida *et al.* 2009), also continue to conclude that the difficult times and economic downturn is the best opportunity to innovate, even if innovation requires additional financial resources, because innovation is the only way to face severe competition and to create distinct strategic position. Likewise, Hammer (2004) recommends strongly organizations to adopt operational innovation especially when there is a low growth in the market along with severe competition. Hammer (2004, p.86) defines operational innovation as "coming up with entirely new ways of filling orders, developing products, providing customer service, or doing any other activity that an enterprise performs". He suggests operational innovation, because of operational innovation involves offering new ways or new simplified processes to perform the organizational work cheaper and faster, leveraged by IT capabilities, which in turn lead organizations to superior market position by increasing customer satisfaction and more differentiated offerings. As a result, the improved market position will lead to strategic benefits like higher customer retention, greater market share and the ability to penetrate new markets. These benefits are shown in Figure 2.4

Strategic benefits
- higher customer retention
- greater market share
- ability to execute strategies
- ability to enter new markets

Marketplace benefits
- lower prices
- greater customer satisfaction
- differentiated offerings
- stronger customer relationship
- greater agility

Operational benefits
- lower direct costs
- better use of assets
- faster cycle time
- increased accuracy
- greater customization or precision
- more added value
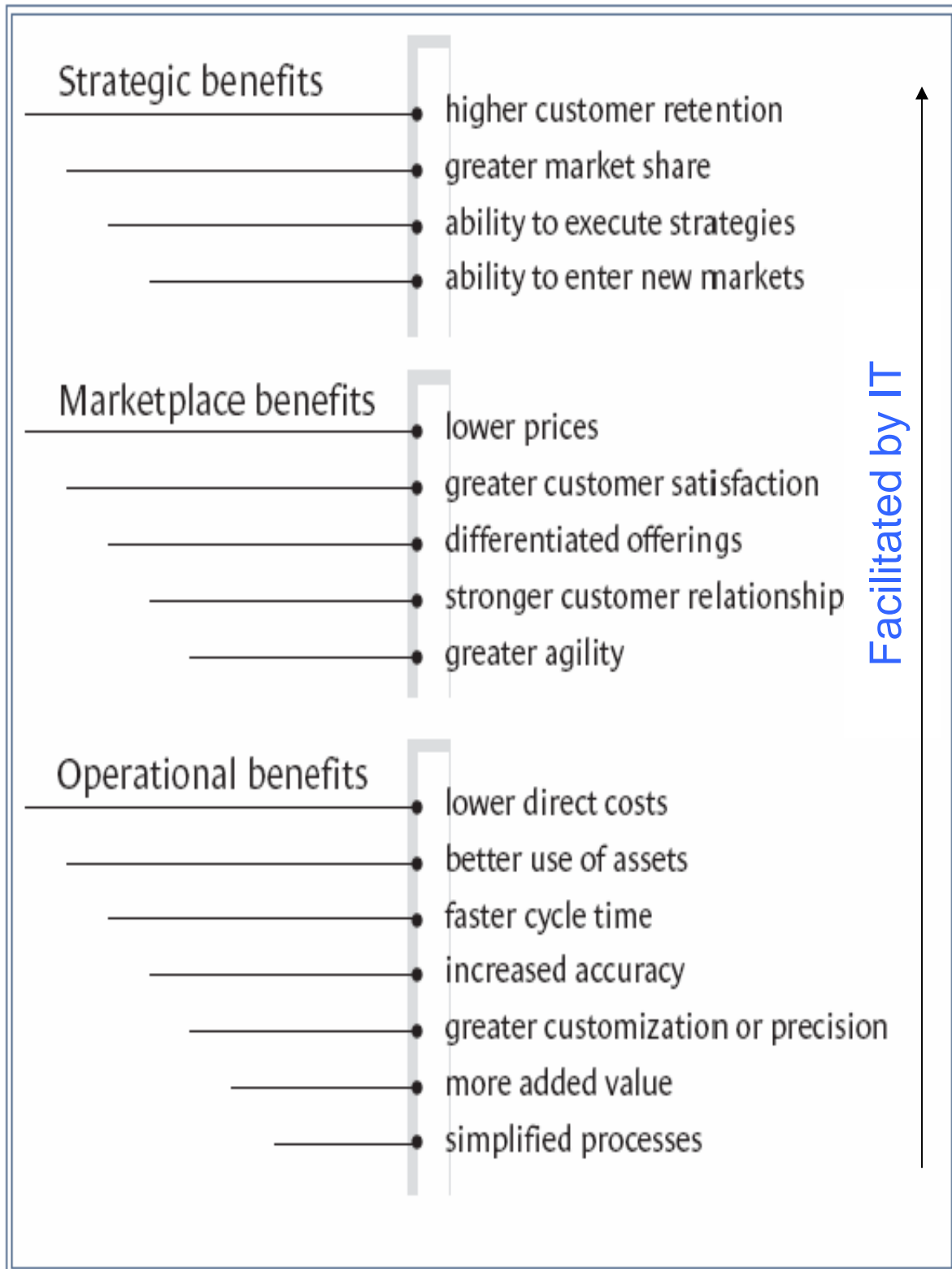- simplified processes

Facilitated by IT

Figure 2.4 Operational Innovation Benefits; adapted from: Hammer 2004, p.87

2.5.1.4 Innovation Process

To make innovation as a habit for organizations, many authors (Drucker 2002 ; Hargadon and Sutton 2000; Skarzynski and Gibson 2008) thought about institutionalizing innovation process to make organizational innovation more systematic. For instance Drucker (2002) who said systematic innovation rarely comes from inspiration but comes from a well-managed endeavor started by analysis of the sources of new opportunities. He found seven sources; four of them come internally within the organization like unexpected occurrences, incongruities, process needs and industry and market changes. The other three sources are external like demographic changes, changes in perception and new knowledge. On the other side, Skarzynski and Gibson (2008) find that although many enterprises like (GE, P&G, Google and Best Buy) hold common view about the importance of innovation, each one of these companies manages innovation in a very different way. However, the later authors (Skarzynski and Gibson 2008) argue that organizations can and must take a more systematic approach to innovate and they recommend strongly organizations to adopt specific organizational capabilities that help organizations to systematize innovation, and one of these organizational capabilities is a well-designed innovation process. This section will explain an open innovation process that is called knowledge brokering cycle proposed by Hargadon and Sutton (2000). By this process, organizations are looking to seek new ideas from outside people who work in different industries, disciplines and contexts and to utilize these ideas in developing new business practices or new processes (Billington and Davidson, 2010)

Knowledge Brokering Cycle as an Innovation Process

Hargadon and Sutton (2000,p.158) maintain that the best innovators are not the only geniuses but they are those who can systematically use old ideas as the raw materials for new ones by serving as intermediaries or brokers between disconnected pools of ideas, which can be used in new places, new ways, and

new combinations. This process, which is taking an idea that is commonplace in one area and moving it to a new context where it is not common, is called knowledge brokering cycle (Hargadon and Sutton 2000).

To make this cycle a sustainable process to provide continued innovations in systematic way, Hargadon and Sutton (2000) propose four sub processes that together constitute the knowledge brokering cycle: capturing good ideas, keeping ideas alive, imagining new uses for old ideas, and putting promising concepts to the test.

1- Capturing good ideas: In the first process, knowledge brokers carefully look into different markets, different industries, and even different geographical areas as well as the internal business units and other corporate branches, just to collect promising ideas even if they currently do not have specific usage. Next, they take these potential ideas along with existing smart or creative components that are unique to uncover its purpose, functionality, specific characteristics and smart behaviors and they file all of these for future development.

2- Keeping ideas alive: Ideas are collected in order to be used and applied practically, but this will not be occurred if they are forgotten. To make ideas alive and not forgotten, the authors (Hargadon and Sutton, 2000) suggest spreading old ideas and disseminating information about usage, value, how to exploit old ideas and by whom.

3- Imagining new uses for old ideas: In this process, the innovations occurred when old ideas that have been captured and remembered are plugged into new usages and new contexts. People recognize new uses for the ideas they have captured and kept alive, or providing powerful solutions for new problems based on old ideas by finding analogies between old ideas and new problems. In addition, people constantly are looking for the external environment for emerging technologies and their applications.

4- Putting promising concepts to the test: The last process is testing the ideas to show whether an innovative idea has a commercial demand, and if it can be technically achievable and financially affordable. So the focus in this process is to find the best ideas to solve existing problems or to create innovation opportunities, even if there is a need to outsource part of the process.

It is worthy to note that, in a study by McKinsey (2010a), it is shown that knowledge brokering is not limited to developing new products that require incorporating external ideas but it can also be applied in process innovation. For example, knowledge brokering can help organizations delivering better and faster solutions for many operational, organizational and strategic problems as these organizational issues are widespread among many organizations, so people can collaborate to find solutions for their firms. For this reason, many organizations refer to "knowledge brokering" concept to **find** and not to invent world-class solutions to their business problems and not only to their new products and services. (McKinsey 2010a)

Hereby, and after clarifying some generic aspects that are related to organizational innovation, now we become more able to understand why and how IT can play an effective role in organizational innovation.

2.5.2 Why and how is IT Effective in Organizational Innovation?

IT can play an effective role in organizational innovation because of its capabilities in different aspects included integration, coordination, communication, computation, storing data beside others. In early times, Teng (1994 cited in Attaran 2004, p.586) argued that innovative uses of IT would guide organizations to develop novel, 'coordination-intensive' abilities that allow them to coordinate their work activities in ways that were not possible before. Similarly, Brown and Hagel III (2003) consider the innovation opportunity thrives using IT, because IT advances create possibilities that were not previously obtainable like electronic coordination and communication with external bodies, especially that

many innovation opportunities come from outside the organization's walls which require novel coordination that realized by IT means. Based on this perspective, many organizations depend heavily on their suppliers and customers to develop innovative initiatives together where IT can bring all of them in one single platform to communicate and to share different innovative ideas. This can be clear in e-government services where the government and its customers and sometimes with partners like banks jointly develop innovative services based on IT advances. Likewise, a recent article by Cash *et al.* (2008) gives a supporting view but within organization when they consider IT is essential for two compelling sources of business growth: innovation and integration, which together allow an enterprise to engage more customers and bring more goods and services to the market. Moreover, IT's role in combination and integration cannot be found only internal and external organizations. It is also very essential in converging of different technologies to create radically new possibilities. Take for example, when a company combines data analytics and smart phones or PDA devises with GPS capability to target specific segment of customers (Cash *et al.* 2008).

This relation between IT's integrating role, and organizational innovation is assumed highly significant and it is a cornerstone for innovation development because of successful innovation often depends on the ability to coordinate efforts across organizational boundaries. The integration which is considered one of the areas where IT plays effective role to develop innovation defined by Cash *et al.* (2008, p.92) as "making the multiple units, functions, and sites of large organizations work together to increase capacity, improve performance, lower cost structure, and discover opportunities for improvement that don't appear until you look across functions".

Therefore, and as it was clear from innovation definitions that innovation is a knowledge-based process (Herkema 2003 ; Plessis 2007) which means seeking new knowledge or new ideas to be applied by the firms' resources. In this regard,

IT can play significant role to collect, store, integrate and disseminate these new knowledge or new ideas, then coordinate between different parties using IT capabilities on communication and collaboration to make people communicate and collaborate across different business units to integrate the overall efforts in developing new initiatives. Furthermore, process innovation, which is introducing new ways for doing the business operation (Davenport 1993; Peppard & Ward 2007), is benefited from IT by giving organizations a possibility to redesign their organizational processes innovatively based on IT capabilities on communication, integration, data flow across different business units and specialized tools that show how to design, prototype, test, and implement business processes.

Furthermore, Roberts *et al.* (2010) recently study the role of IT in turbulent times and they highly recommend promoting the uses of IT to enable organizations respond more effectively to rapid-changing business needs, which in turn enable organizations to gain competitive advantage by fostering IT-based business innovations. The authors (Roberts *et al.* 2010) highlight that IT role can be promoted when IT is enabled to create new sources of value to organizations in different ways like developing and improving the business processes and technologies to launch a new sales channel, design a technology-enabled product feature, or increase customer retention through online offerings. To productively achieve this IT-based business innovation, the later authors suggest considering these three requirements: the ability to access and share the relevant knowledge that is needed in innovation development, a willingness to experiment the data by conducting several tests to learn new insights from these experiments and the last requirement is to collaborate closely with expert people and interested partners.

2.5.3 An Approach that shows how can IT be Effective in Organizational Innovation?

It may be argued that IT capabilities most likely are technology tools do certain jobs or functions in standard way (Carr, 2003), but how they enable organizational innovation that is evolving in developing new matters. In this regard, Peppard *et al.* (2007) proposed an approach called innovation-based approach that focuses on what IT means and advances can do to maximize the business benefits from different IT capabilities to foster organizational innovation. Therefore, the IT-enabled innovation can be developed by undertaking one of these three ways:

❖ Doing something new involving using IT – like developing new products, services or even processes to develop new initiatives or to solve existing problems innovatively using IT solutions. This type of innovation core ideas are ignited, developed and shared through knowledge management systems then designed, tested and communicated the progress through IT infrastructure tools and specialized computer software. So the role of IT here, is to trigger and to support innovation development.

❖ Doing something in a new way using IT – like introducing new business process for online payment through developing new module in the company website to enable online payment or implementing ERP system to reengineer existing business processes. Other example is, deploy a data warehouse to automate operational decision-making. In this regard, The IT role is indispensable as IT enables and facilitates introducing new business changes for developing new ways to do the business work. See Figure 2.5

❖ Using new IT to do something it could not do before - like Developing new mobile application that enable staff to log their trip expenses during their traveling using their iphones, blackberry phones or other advanced mobiles. Other example is, developing new web application to attract new customers from another country which difficult to attract them using traditional ways. In

this regard, IT role is driving the business innovation and without IT this kind of innovations would not be delivered. See Figure 2.6
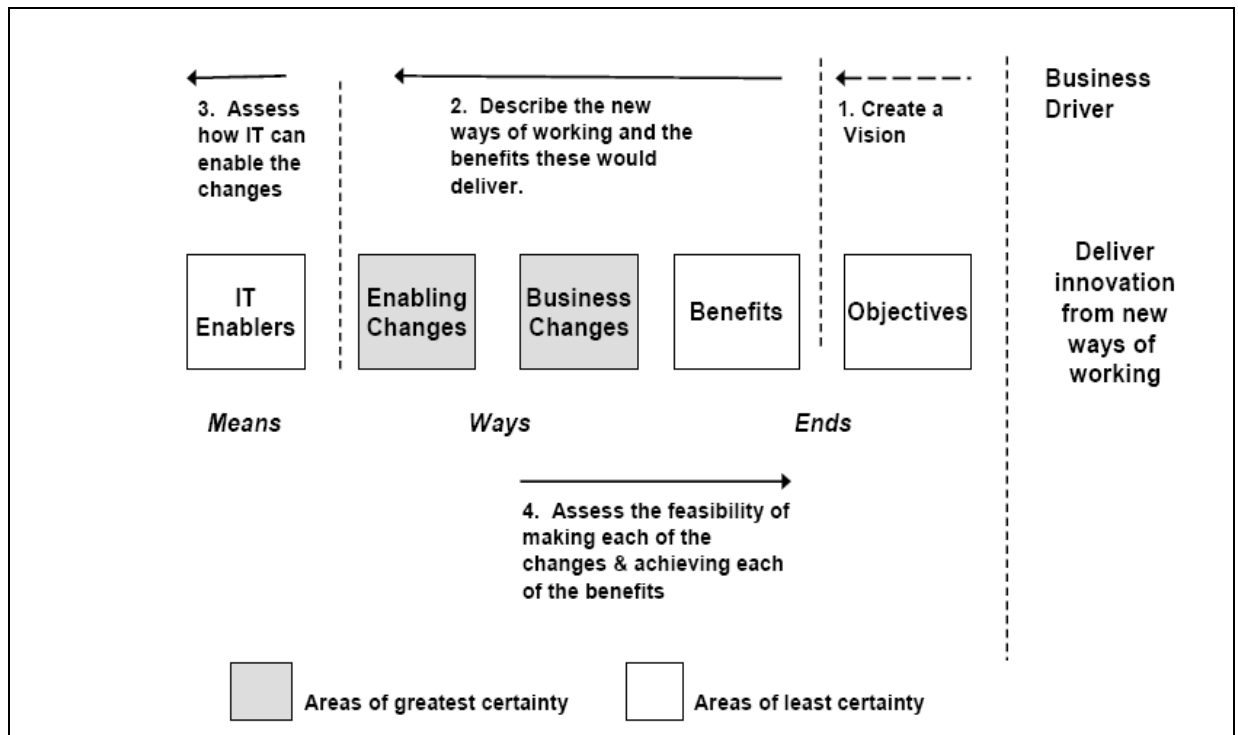
Figure 2.5 – Innovation based on new ways; Source : Peppard & Ward (2007,p.18)
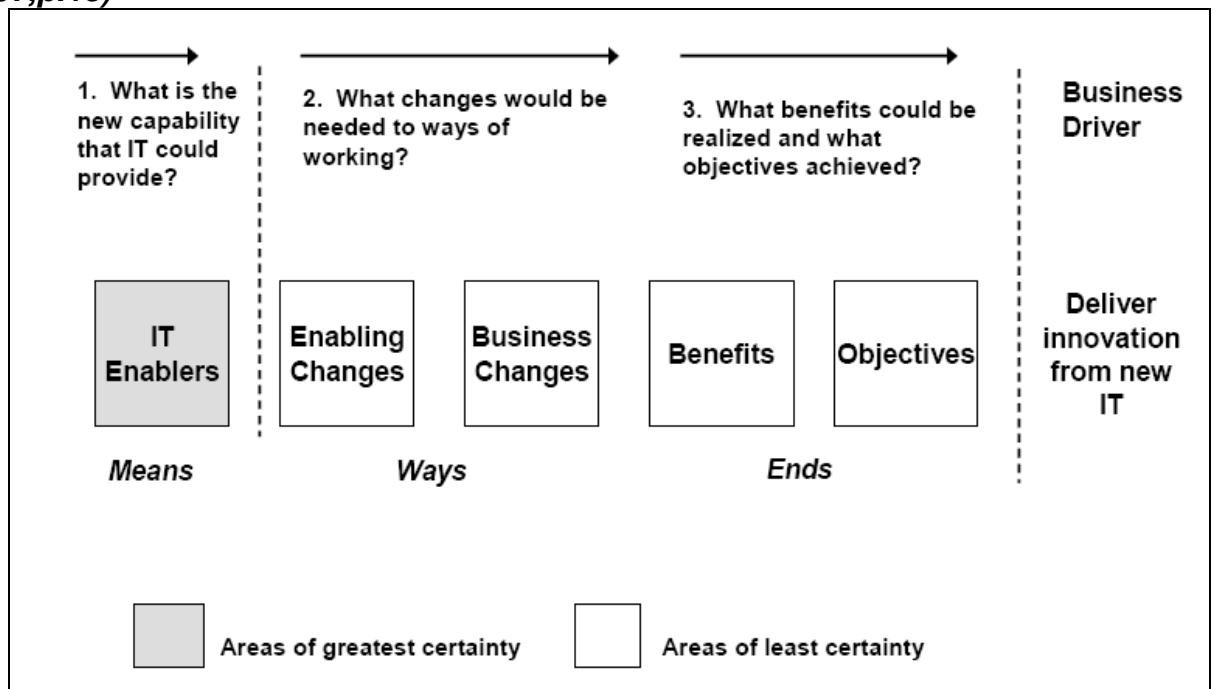
Figure 2.6 – IT innovation-based solutions; Source : Peppard & Ward (2007,p.19)

2.6 Conclusion & Initial Research Model

After conducting a literature review about the generated business benefits from investing in IT, and in order to summarize the above argument, that discussed throughout the chapter. It is proposed that:

H1: The returned value from IT investment can be realized through obtaining many business benefits like enhancing quality, customer satisfaction and fostering innovation

 The outcome for the fore-mentioned argument is illustrated in the initial research model that can be shown in Figure 2.7.

IT Investment   *Potential Benefits*

IT Capabilities

H1

Productivity /Financial Benefits
- Enhancing the Productivity
- Increasing the Profit & Cost Reduction

Strategic /Non-Financial Benefits
- Create & Maintain Competitive Advantage
- Enhancing Customer Satisfaction
- Enhancing the Quality
- Reducing the Cycle Time
- Automate Business Operation
- Enabling Organizational Changes

Foster Organizational Innovation
- Develop New Ways/New Work Practices
      (Process, Marketing Innovation)

- Support Developing New Products/Services
      (Product, Service Innovation)

- Solve Business Problems using New IT Means (Technological Innovation)

Figure 2.7: The Initial Research Model - the Generated Business Value of IT

Conclusion

The conducted literature review has provided ample evidence to support the argument that IT can create great business value for organizations including fostering organizational innovation. Provided organizations take the benefit of IT in integration, coordination and communication and combine IT with other business practices to work across overall organization, and the most importantly to plan and to manage for this business value since early times, because this value does not come spontaneously but it needs insights and efforts to be extracted. Reaching such conclusion motivates us to ask what kinds of efforts and capabilities are needed from the UAE firms to make IT provides business value like fostering organizational innovation. In other words, what are the IT capabilities that might affect enhancing the organizational innovation capability? And how?

Chapter Three: IT Capabilities and their Functions that Foster Organizational Innovation

In the literature, there are number of IT capabilities that can play effective role in fostering and supporting organizational innovation. For instance, Quinn *et al.* (1996) mention that "the internet provides new software-based markets, products and services, so the effective utilizing and managing many software capabilities can lead to real competitive advantage and it is considered the key to effective innovation and its diffusion to customers for any company or institution". Whereas Cash *et al.* (2008) give different examples on such capabilities that enable organizational innovation like collaboration software, databases and knowledge management systems, analytical tools, information directories and repositories. But because of every one of these IT capabilities executes many different jobs and can provide many different benefits, this research will examine only those that are related to the research objectives and indicated in the literature as enablers and supporters that influence in certain extent business innovation. In fact, the capabilities that will be examined in this study are mainly knowledge management and enterprise management information systems.

3.1 IT Capabilities that trigger and support Innovation Development

3.1.1 Knowledge Management (KM) Capability

3.1.1.1 KM Definition

Several definitions have been articulated in the literature, but most of them are evolving around one concept which is collecting knowledge then share it to enable people take value from hoarding it. For example, Darroch and McNaughton (2002, p.211) define knowledge management as "The management function that creates or locates knowledge, manages the flow of knowledge within the organization and ensures that knowledge is used effectively and efficiently for the long-term benefit of the organization". On the other hand,

Beckman (1999) focuses on the return value from implementing knowledge management initiative, who defines KM in a study by Gloet and Terziovski (2004, p.403) as "the formalization of and access to experience, knowledge, and expertise that create new capabilities, enable superior performance, encourage innovation, and enhance customer value".

3.1.1.2 Importance of Knowledge Management

Interestingly enough, in 1992, Capon *et al.* profiled 113 innovative manufacturing companies in the USA from Fortunate 500 and they found that acquiring other firms, as a way of possess new knowledge, did not significantly affect the ability of a firm to innovate. However, this finding shows having knowledge alone as an asset without effective usage and management could not necessarily lead to business benefit especially organizational innovation and as Darroch (2005, p.102) states "simply owning resources is not necessarily going to provide any kind of advantage to the firm.". In this sense, to gain value from the corporate knowledge and to become more able to turn it into practice as generated business value, organizations should manage the knowledge effectively and thereby the role of knowledge management is to make the knowledge available whatever and whenever is needed (Becerra-Fernandez *et al.* , 2004).

3.1.1.3 Knowledge Management Theory

To manage the knowledge, one common theory in knowledge management is knowledge-creating company that was introduced by Nonaka (1991) and was explained in details in Nonaka and Takeuchi (1995). In this theory, the authors strongly believe knowledge is the lasting source for competitive advantage. They assume the success of many Japans companies like Honda, Canon, and Sharp beside others is contributed to managing the creation of new knowledge, because creating new knowledge can result in responding quickly to customers, creating new markets and rapidly developing new products and emergent technologies. Hence, "successful companies are those consistently create new knowledge, disseminate it widely throughout the organization, and quickly

embody it in new technologies and products" (Nonaka, 1991), rather than keeping it as abstract object. These activities define "knowledge-creating" theory; that sole business is continuous innovation. Although this theory was appraised by many researchers, there were others who criticized it. This criticism was summarized in Gourlay (2006) work, and the main critique focused on the neglect of previous research (Jornas 1998), beside Essers and Schreinemakers (1997) and Bereiter (2002) who have concerns with the consequences of the theory that does not explain the process to mange the organizational knowledge. Hence, this theory was revisited by Nonaka and Toyama (2003) to explain how the knowledge can be created and interacted within a process. Later on, in 2005 same authors improved it again to enhance the flexibility of synthesis the knowledge contradiction to embrace the knowledge that created within context of interaction rather than just dealing with static knowledge.

3.1.1.4 Which Knowledge to be managed?

It may be argued that in daily business there is a lot of knowledge that some of them are generated by the business, and some of others come from external sources, whereas the other are stored inside people brains. Thus, there is a need to decide which knowledge, from the ample amount of available knowledge, that is helpful to be shared and managed in order to support innovation. Christensen (2007) investigates about that knowledge types and his study reveals the knowledge that should be shared is not only the one that is emerged from best practices. Rather, he demonstrated empirically four types of knowledge that principally to share: professional knowledge, coordinating knowledge, object-based knowledge, and know-who.

Professional knowledge that is related to know-how or the operation practices, whereas the coordinating knowledge, which is who will do what and when or the rules, polices and procedures that are designed to help doing the business. Object-based knowledge that is related to how certain objects are working and reacting, and it comes from combining specialized knowledge with the

coordinating knowledge. While the last one is know-who that is related to where the knowledge exists or who can help on a certain issue.

3.1.2 The Role of Knowledge Management Systems in Organizational Innovation

3.1.2.1 Introduction

As "innovation is knowing rather than doing" (Drucker 2002, p.5) and the innovation process is, by its nature, knowledge intensive (Gloet and Terziovski 2004). Thus, it is critical to adopt knowledge management as a discipline to enable organizations create business value like developing innovation based on KM systems and tools, and to take the great benefits from one of invaluable resources that organizations have, which is the accumulated knowledge. As Bradley (1996 cited in Becerra-Fernandez *et al.* 2004, p.6) said:

"Today, knowledge is accumulating at an ever increasing rate. It is estimated that knowledge is currently doubling every 18 months and, of course, the pace is increasing…Technology facilitates the speed at which knowledge and ideas proliferate".

Therefore, there is a thrilling need for specific discipline, which is knowledge management systems that can be built by IT advances to enable knowledge workers access and share this wealth of ideas and constructive knowledge to exploit their benefits and to build on their values.

In fact, many authors found positive relation between knowledge management systems, with their respective processes, and organizational innovation in different conditions and using different constructs. For example, Gloet and Terziovski (2004, p.408) have established that knowledge management practices affects positively and significantly innovation development when an integration between "soft human resource management practices" and "hard IT practices" are jointly implemented. Likewise, the work of Plessis (2007, p.22) reveals that knowledge management plays a significant role in innovation especially in organizations that have distinct knowledge management and innovation programs. Additionally, she concluded that knowledge management is not solely

focused on innovation, but it creates an environment embracing and supporting innovation developments by nurturing a culture that really values knowledge and its applications, and this culture, in turn, encourages innovation.

On the other hand, and based on empirical research, Darroch and McNaughton (2002) contend that knowledge management does not support developing innovations and they remark this negative relationship is showed because not all knowledge management processes impact innovation. Furthermore, they specifically claim that no informal or formal knowledge diffusion factors were found to directly affect innovation development, and they believe knowledge dissemination as part of strategic architecture that provides indirect support to real organizational outcomes such as innovation. Comparing to former research, in later study, the main author, Darroch (2005) finds that the role of effective knowledge management as a coordinating mechanism can support developing incremental innovations. This is because organizations with a knowledge management capability will use resources more efficiently and in turn will be more innovative firms. Whereas she finds limited support for the role of well-developed knowledge management in developing completely new or dramatic innovations, as there is a need for more new capabilities beyond the knowledge availability. However, it seems these different findings may be showed because in the recent study (2005), there are relatively more developments in research and practices about knowledge management systems than 2002 and Darroch (2005,p.105) herself commented, "It is difficult to draw conclusions from the literature regarding the relationship between effective knowledge management and innovation. This is not because empirical evidence refutes the existence of such a relationship, but simply because research examining this link is developing".

In Contrast to earlier research, later studies (Lin 2007; Chang and Lee 2008; Shang *et al.* 2009; Vaccaro *et al.* 2010) investigate empirically more about this relation by examining different knowledge management processes and constructs and they provide more convincing views, especially many IT advances

in collaboration and knowledge sharing systems and tools have thrived over the last many years. For example, Lin (2007) examines how individual, organizational and technological factors influence the knowledge collection and sharing. One of her findings is that IT plays effective role in enabling employees to collect knowledge, which by the result strengthen deeply the capability of the organizational innovation, and she noted that innovation involves a broad process of knowledge sharing that can provide a great opportunity for appropriate implementation of new ideas, processes, products, and services. At the same time, knowledge collection has the ability to enhance innovation development when that knowledge is stored into an integrated database that combine business processes, routines, feedback from customers, suppliers and staff skills to provide comprehensive source for analysis that attract knowledge brokers to propose potential ideas that lead to innovation development (Shang *et al.* 2009). In order to do such integration that fructifies innovation, there is a need to establish well-developed knowledge management systems and tools, to enable organizations make effective use of their own resources. So that they can accumulate business management experiences along with other corporate knowledge, and through the integration and application of that stored and integrated knowledge, organizations become more able to trigger innovation activities based on this integrated and accumulated knowledge base (Chang and Lee 2008). Moreover, such knowledge management systems and tools support not only developing innovations but also enhance the speed of innovation development (Vaccaro *et al.* 2010).

Hence, it can be suggested to take these perceptions as research propositions that require to be elaborated in next section and to be explored and tested empirically throughout this study. Because this research aims to investigate the role of certain IT capabilities in organizational innovation, the study will be focused into those functions that are delivered by these capabilities and are indicated in the literature as effective factors in supporting and enhancing organizational innovation.

3.1.2.2 The role of Knowledge collecting and storing in Organizational Innovation

Within organizations, knowledge is collected and stored from customers, suppliers, staff members, processes, business products and services combined with other knowledge from external sources like the market conditions and needs. Accumulating such knowledge over the time constitutes the corporate knowledge or the intellectual capital for that firms (Becerra-Fernandez *et al.* 2004). This accumulated knowledge must be integrated into critical decisions and it should be learned and exploited for business enhancements and developing innovations. Lin (2007) finds that IT-based knowledge management systems play effective role in enabling firms to collect and store knowledge, which by the result enhance strongly the capability of organizational innovation. In fact, collecting knowledge can trigger innovation when that knowledge is stored into an integrated bank of know-how knowledge along with the consolidation of knowledge about customers, products, services, and the available skills to provide a base for analysis of opportunities, processes, behaviors, problems, and resources. By conducting this deep analysis on the accumulated knowledge repository, new and fresh understanding can be articulated to trigger new developments of business innovations (Shang *et al.* 2009).

Furthermore, knowledge management systems deal with explicit knowledge, which is allocated in documented materials and can be expressed in numbers and words (Becerra-Fernandez *et al.* 2004), to provide innovative ideas. This can be done by gathering the explicit knowledge internally and externally, next, storing and accumulating them by internal IT infrastructure tools then retrieving and finding associations between these different knowledge and ideas to recombine or classify them using analysis tools to generate insights that may lead to promising innovative ideas.

Therefore, it is assumed that H2a: Knowledge management systems through knowledge collecting and storing can trigger and support innovation development

3.1.2.3 The role of Knowledge Integration and Sharing in Organizational Innovation

As discussed before, IT has generally strong ability in integration process (Cash *et al.* 2008). Accordingly, IT-based knowledge management systems make organizations capable to communicate and exchange knowledge across different organizational entities that share knowledge and experiences. For instance, providing access of a well-developed document management system for the entire organization and to all people from all branches will improve innovation process because this system can provide an access to the required knowledge throughout innovation process.

However, other researchers, who advocate the positive relation between knowledge management and innovation, affirm that this formation requires embracing some IT advances to manage the knowledge effectively and to benefit from IT capabilities in knowledge codification and integration. One of those authors, Baddi and Sharif (2003), who make clear that the business value from having knowledge cannot be realized and cannot lead to organizational innovation, unless knowledge is integrated, linked and adapted using advances in IT. Likewise, Cash *et al.* (2008, p.93) highlight that the benefit from IT-based systems can be realized when organizations build an integrated platform of business processes, information, systems, and technology, and by sharing organization's experience and expertise. This can be achieved by building cohesive "horizontal discipline" on their business based on shared processes and services across different business units. Thus, by conducting such integration between different knowledge from multiple internal business units and external sources, that facilitated by IT capabilities, knowledge becomes more valuable, powerful and can be easily accessed, shared and applied in different innovation initiatives.

In addition to that, knowledge management systems facilitate the codification and sharing tacit knowledge, which reside in knowledge workers brains(Becerra-

Fernandez *et al.*, 2004) as sharing tacit knowledge is positively affect innovation capability (Cavusgil *et al.* 2003). The later authors indicate that tacit knowledge can be coded and then shared after collecting it from internal staff and from partner firms through their close and frequent interaction. Tacit knowledge is clearly apparent in electronic communities of practice. For example, Project Management Institute recently initiated internet-based (PMI's COP) in different business industry. Such initiative helps people developing innovations when an individual from a certain background tells a story or explains his/her experience in developing a product or a service, as well discusses different kinds of problems that have been faced throughout the development. Subsequently, other people can take this experience to build on that by developing innovative product, service or process in his domain or in his country or by using different resources and technologies.

Therefore, it is assumed that

H2b: Knowledge management systems through knowledge integration and sharing can trigger and support innovation development

3.1.3 IT Infrastructure Tools on communication and collaboration that Facilitate and Support Business Innovation

In the literature, there are many researchers and authors who highlight the importance of specific IT infrastructure tools that facilitate and support organizational innovation. For example, Cash *et al.* (2008) recommend strongly the companies that are looking to enter innovation arena to embrace the latest generation of tools for flexible communication and collaboration. Cash *et al.* (2008, p.9) add that "these tools enable people to collect, share, and productively use more sources and kinds of information-conversations, opinions, and know-how expressed in audio and video, for instance, not just text and data records. They can spur creativity and help coordinate both formal and ad hoc interactions, and hence should form much of the tool kits of both the innovation and

integration groups". However, the extent that enables an organization to externally collaborate with other organizations and other people is depending on the mode that can be chosen to collaborate. Actually, in Figure 3.1 Pisano and Verganti (2008) show different collaboration modes to enable organizations choose the best one to help them in innovation development.

Innovation Mall

A place where a company can post a problem, anyone can propose solutions, and the company chooses the solutions it likes best

Example: InnoCentive.com website, where companies can post scientific problems

Innovation Community

A network where anybody can propose problems, offer solutions, and decide which solutions to use

Example: Linux open-source software community

Elite Circle

A select group of participants chosen by a company that also defines the problem and picks the solutions

Example: Alessi's handpicked group of 200-plus design experts, who develop new concepts for home products

Consortium

A private group of participants that jointly select problems, decide how to conduct work, and choose solutions

Example: IBM's partnerships with select companies to jointly develop semiconductor technologies

PARTICIPATION — Open / Closed

GOVERNANCE

Hierarchical | Flat
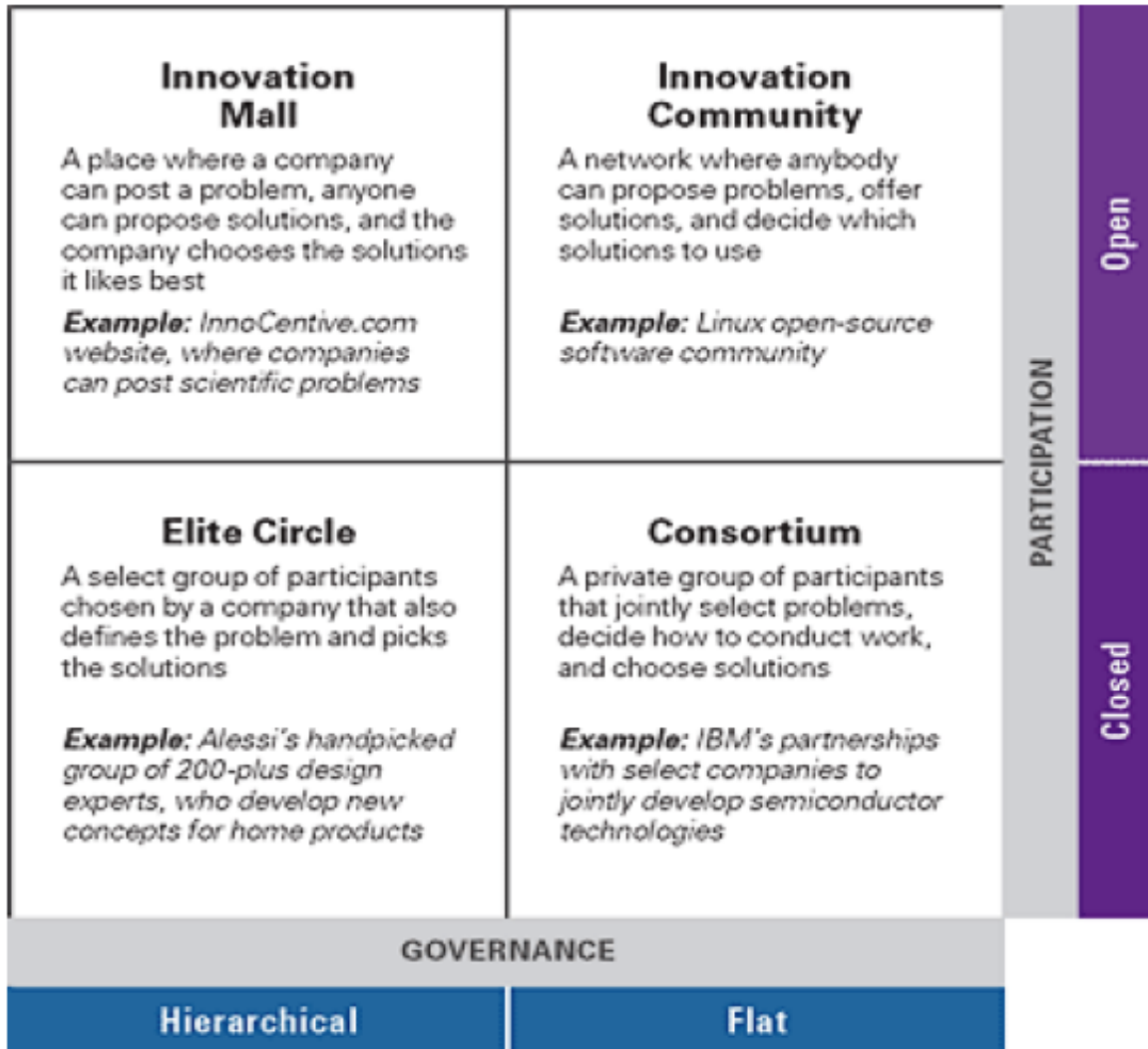
Figure 3.1 – Choosing a Collaboration Mode; Source: Pisano and Verganti (2008, p.82)

In the diagram that is shown above, participation means who can participate or offer innovative ideas, whereas governance means who decide about the best solution or the best idea. To go further, in the open participation, "Innovation Community" or "Open-Flat" means anyone can offer innovative ideas but no

single one who decides about the best idea, as participants themselves who jointly evaluate the best solution. Whereas "Innovation Mall" or "Open-Hierarchical" means anyone can offer ideas but specific company or specific people who defines the problem and chooses the best solution. This can be clearly seen in innocentive.com, in this website, only authorized people from registered organizations as partners can post a challenge that requires an innovative idea that does specific job or solves specific problem. Those people themselves who can evaluate and choose the best relevant idea that could be suggested from any one; later on, the owner of the selected idea is being rewarded.

On the other hand, in the closed participation, "Consortium" or "Closed-Flat" means a private group is invited to offer innovative ideas, but the participants themselves who share the ideas can decide together about the best one.

"Elite Circle" or "Closed-Hierarchical" means specific company identifies who can offer innovative ideas and same company who decides a valid innovation.

However, the important aspect in this collaboration mode is choosing the mode based on the available situation. For example, if you want to collect too many ideas but you do not have the expert people to choose the best one, it is preferred to choose "Innovation Community" to make people themselves evaluate the suggested ideas. On the other side, when you are thrilling to huge ideas and you have many experts to select the best one, at that time, it is preferred to choose "Innovation Mall" (Pisano and Verganti 2008).

To illustrate this, when Apple Company developed the iPhone, Apple used closed-hierarchical network (Elite Circle), where the company can better control the components that may affect users' experiences. Later on, once the iPhone was introduced, Apple formulated an innovative growth business model based on incorporating third party software applications. This is because the company knew it could not expect all the applications iPhone users might value, so it chose open-flat network (Innovation Community), to allow many collaborated companies to develop applications based on the iPhone operating system

platform to enable all iPhone owners' use these applications directly (Pisano and Verganti 2008).

In fact, collaboration is defined by Plessis (2007, p.24) as "the ability of customers, suppliers and employees to form knowledge sharing communities within and across organizational boundaries, that can work together to achieve a shared business objective, resulting in benefits to all community members". At the same time, the collaboration between different parties', whether within organizations or outside them, plays a significant role to build collective know-how expertise and transfer it (Cavusgil *et al.* 2003). As a result, "gathering tacit knowledge from collaboration partners could potentially reduce risk and cost in innovation by ensuring "a first-time-right approach", thus shortening development cycles and ensuring effective innovation" (Cavusgil *et al.* 2003, p.15). Actually, knowledge management can facilitate collaboration as mechanism to foster innovation through IT infrastructure tools to enable knowledge sharing within knowledge sharing communities or groups, such as online discussion forums, blogs and social networks and electronic communities of practice (Plessis, 2007).

Moreover, authors like Gordon and his colleague, Tarafdar, published two papers in 2007, regarding the IT competences that affect organizational innovation. In the first work Gordon and Tarafdar (2007) find that "there are certain IT competencies can help organizations be more innovative, they strongly demonstrate that IT competences in the areas of information and knowledge management, collaboration and communication, and business involvement positively affect an organization's ability to innovate". Whereas in the second work, Tarafdar and Gordon (2007) show similar positive relation between number of IT competences and organizational innovation, and further they report about some kind of overlapping between these IT competences. For instance, the corporate portal was a common aspect between knowledge management and collaboration competencies. They find the corporate portal can be used for disseminating information as part of knowledge management competency by

pooling and disseminating information about firms' projects and innovations. At the same time, they find the corporate portal can be used for obtaining user feedback as part of collaboration competency because the availability of information made it easier for end users to evaluate and give their feedback about firms' products, services, and processes.

Furthermore, the electronic communications between different parties internally and externally create ongoing and real time communication that can overcome the geographical barriers. As Attaran (2004, p.590) states "recently, there has been a significant growth in collaborative computing products. These range from software for conducting meetings on-line to complex programs that enable a number of users to collaborate in real time, sharing documents, managing projects and handling different tasks. These include idea generation, brainstorming, group outlining, voting, teleconference, meet-me-service, etc".

In short, IT infrastructure tools can enhance effectively innovation when different companies decided to collaborate in developing an innovative initiative. This IT role can be envisaged in different ways: specific software applications can be integrated with other software application or with a device to develop together an innovative application do certain jobs in innovative way. Also by IT tools in the internet a company can collect huge ideas especially when open participation whether innovation community or innovation mall is chosen to gather innovative ideas by social networking software and by specialized electronic community of practice or specialized web sites like "innocentive.com", "ninesigma.com" and "yet2.com". Moreover, some IT tools can provide an effective environment for different parties who located in different places to work together like collaboration suits. Therefore, all of these ways can effectively enhance the role of IT tools in collaboration in order to develop innovations.

Therefore it is assumed that

H2c: IT infrastructure through communication and collaboration tools can trigger and support innovation development

3.1.4 IT Infrastructure Tools on designing and computing that Facilitate and Support Organizational Innovation

IT capabilities such as hardware, software and other specialized systems can be used to facilitate the designing of innovative business processes and designing different prototypes or pilots for new initiatives, as well as conducting mathematical calculations to compute the expected returns from implementing new initiatives and the most importantly conducting statistical computations to analyze the historical data. For example, Attaran (2004, p.586) states simply "IT capabilities involve improving information access and coordination across organizational units. It is so powerful that it can actually create new processes design options, rather than simply support it". Same author continue to remark that IT is more than a collection of tools for automating or mechanizing processes. It can fundamentally reshape the way business is done and enable the process design. Actually, business process reengineering and IT working together, and this will have the potential to create more flexible, team-oriented, coordinative and communication-based work capability (Whitman, 1996 cited in Attaran, 2004).

In this regard, some researchers (e.g. Attaran 2004 ; Cancer and Mulej 2006 ; Shange *et al.* 2009) found many aspects that information technology tools can play in order to facilitate developing new initiatives.

- ▪ Measuring and evaluating the potential investment and the expected outcomes from re-designing business processes by gathering, analyzing and computing the effects of every process. IT can facilitate this aspect by using the modeling applications, workflow charts and simulation tools. In addition of gathering the feedback using survey and analyze the outcomes using IT tools. As well as the IT role in simulation tools that enable the organizations to conduct influence diagrams, payoff tables, and decision trees that can be used to structure a decision problems and describe the relationships among decisions, chance events, and consequences (Cancer and Mulej, 2006 ; Attaran, 2004)

- The value of the workflow systems that can be used to help the firms' management in sensing the changes, identifying the managerial bottlenecks, re-evaluating customer demands, reconstructing the processes, creating and utilizing the knowledge base, optimizing the routines, and eventually accomplishing a successful service process innovation and customer satisfaction. (Shange *et al.* 2009)

- By using the project management tools IT can facilitate the business process re-design. This can be done to estimate the cost and the time for the re-designing activities and to control the contingencies that a rise during the process and by the communication tools a long with the project management tools, organizations become more able to optimize the re-design process. (Attaran, 2004)

Therefore, it is assumed that

H2d: IT infrastructure tools through designing and computing functions can facilitate and support developing organizational innovation.

3.1.5 The Role of IT in supporting an Open Innovation Process (Knowledge Brokering Cycle)

After this exploratory study of the literature regarding the IT business value and its impact on organizational performance generally and on organizational innovation in particular, our contribution to the literature is not only to extend our understanding on this area. This research also aims to create insights into how can IT when it is used effectively and in integrative way can facilitate and sustain the knowledge brokering cycle, which is considered one of the valuable innovation process that is proposed by Hargadon and Sutton (2000) and discussed in section 2.5.1.4.

It assumed that the integrated IT capabilities especially knowledge management capability along with IT infrastructure tools may support and facilitate every sub

process in the knowledge brokering cycle to make this process sustainable, as IT capabilities using web-based software can match internal seekers who have business problems with external solvers who can provide innovative solutions (Billington and Davidson, 2010). Figure 3.2 shows a suggested model for the role of IT in the four sub processes of the knowledge brokering cycle.

1- Capturing good ideas:

This sub process without information technology capabilities and tools are not probably going to be implemented easily as by the time the collected ideas are increasing rapidly, therefore retrieving specific idea without certain IT capabilities will become a mystery. Thus, IT can facilitate ideas proliferation by collaboration technologies including social-networking systems, internet and intranet-based forums, knowledge exchanges, and Web 2.0 tools such as wikis, blogs and specialized forums (Cash *et al.* 2008). Using such web 2.0 tools like "web-based social networking sites means that the collective know how of millions of managers is more accessible than ever" (Billington and Davidson, 2010, p.2). As a result, this will enable knowledge brokers to collect external ideas from different contexts and save them within local databases with certain classifications and combinations (Lin 2007), then, those structured-based ideas can be retrieved according to a search criteria that serving a specific business matter. In addition of that electronic communities of practice that are specialized in specific domains provide a wealth of good ideas that most of them "now-how" knowledge, best practices and lessons learned (Plessis 2007).

2- Keeping ideas alive:

Ideas can be alive when they are disseminated to make people know about them. In this regard, IT plays effective role in spreading information then collecting feedback from all interested knowledge brokers (Tarafdar and Gordon 2007). This can be accomplished by different means like generating well-documented reports *to show what*, professional presentations *to show how*, electronic directories that present lists of experts with their interests *to show by whom*. In further to other ways like smart hyperlinks that refer to external

knowledge resources to show different combinations and associations, also by collecting discussion results and feedback through organization's intranet. All of these can help an organization take the benefit from existing ideas that leveraged by information technology capabilities (Lin 2007 ; Plessis 2007 and Cash *et al.* 2008)

3- Imagining new uses for old ideas:

Once knowledge brokers become knowing about certain constructive ideas, they can provide different suggestions and new uses to apply that ideas in new initiatives or to solve particular problems. This can be clearly seen when people are constantly scanning external environments to look for emerging technologies and their applications that can serve their business. One way to do that is by conducting market research about the latest in technology, working with leading-edge technology vendors to have their suggestions, monitoring the experiences of early adopters, and recognizing the potential of experimental IT applications on small-scale framework (Cash *et al.* 2008). Moreover, information technology in this step enables people to search by the internet and by other collaboration tools for new uses or solutions for current problems using the specialized groups and networks (Plessis 2007). Then, once they find certain attractive idea, they can use designing and simulation software that enable them adapt potential ideas to suite their needs and to prepare these ideas to the next step (Shang *et al.* 2009).

4- Putting promising concepts to the test:

After allocating potential and relevant idea that expected to generate business benefits to the organization, the most urging aspect that should to be considered is to test the potential idea in the organization that adopted this idea. Information technology is critical in this stage to build rapid prototypes (Shang *et al.* 2009), using professional and specialized-purpose software applications to give guidelines about the resources and expertise that needed and if they are available. This kind of IT applications also help in computing the expected returns, expenses, conducting experiments to suggest the optimized pricing rates

in addition to calculating the expected demand (Cancer and Mulej 2006 and Attaran 2004).

Accordingly, the four sub processes of knowledge brokering cycle provide insights and applications to the four mentioned hypothesis H2a, H2b, H2c & H2d.
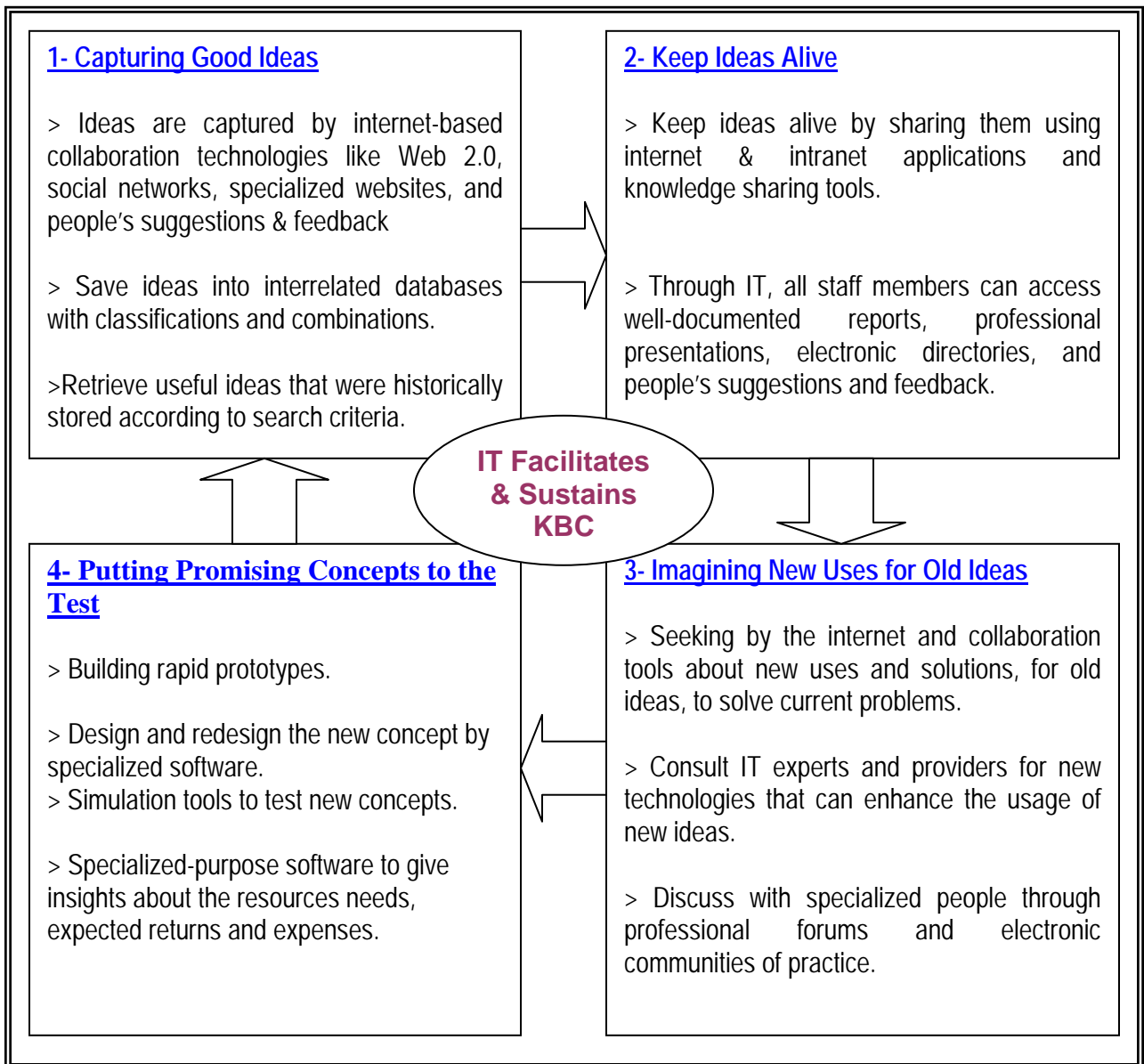

Figure 3.2 – the role of IT in knowledge brokering cycle (KBC).

3.2 IT Capabilities that develop IT-based Innovative Practices

3.2.1 Enterprise Management Information Systems (EMIS) Capability

3.2.1.1 EMIS Definition

Enterprise management information system can be defined as an integrative mechanism connecting diverse organizational units by shared data and software modules (Davenport, 1998). And as cited in (King and Burgess, 2006, p.60) Aladwani (2001) defines these systems as ''an integrated set of programs that provides support for core organizational activities such as manufacturing and logistics, finance and accounting, sales and marketing, and human resources'' . Recently Malhotra and Temponi (2010, p.29) define the enterprise planning system as "a process of innovation that enhances data processing, distribution, and service standards via the employment of new methods, hardware, software, and human resources. An ERP system, implemented across an organization and affects almost all the business processes of that organization". So according to the above definitions and reviewing previous literature , the enterprise management information system can provide an opportunity to support and trigger the organizational innovation because of two main reasons: Firstly, the ability to integrate and automate the overall business process in unified and consisted way to serve all business functions with identical business practices. Secondly, the ability to provide centralized common database that is shared throughout an organization (Davenport, 1998 ; Gattiker and Goodhue, 2004 ; King and Burgess, 2006 ; Kumar *et al.*, 2010)

3.2.1.2 The Scope of the Enterprise Management Information Systems

The enterprise management information systems are wide and they are developed and enhanced continuously but the most common systems are Enterprise Resource Planning Systems (ERP) and the Customer Relationship

Management Systems (CRM). Normally, the five major processes in a typical ERP system are: finance, logistics, manufacturing, human resources and sales/marketing (Kumar *et al.* 2010). As the creation of ERP systems integrates all functional sections within the enterprise, ERP systems are considered as backbone systems for most firms that integrate back-office applications such as finance, HR, purchasing, inventory management, etc. (Chou *et al.* 2005). However, in Figure 3.3 Davenport (1998) provides a comprehensive list of many modules that jointly constituted one of an enterprise system.

The Scope of an Enterprise System

An enterprise system enables a company to integrate the data used throughout its entire organization. This list shows some of the many functions supported by SAP's R/3 package.

Financials
Accounts receivable and payable
Asset accounting
Cash management and forecasting
Cost-element and cost-center accounting
Executive information system
Financial consolidation
General ledger
Product-cost accounting
Profitability analysis
Profit-center accounting
Standard and period-related costing

Operations and Logistics
Inventory management
Material requirements planning
Materials management
Plant maintenance
Production planning
Project management
Purchasing
Quality management
Routing management
Shipping
Vendor evaluation

Human Resources
Human-resources time accounting
Payroll
Personnel planning
Travel expenses

Sales and Marketing
Order management
Pricing
Sales management
Sales planning

Figure 3.3 – the Scope of An Enterprise Resource Planning System ; Source: Davenport (1998, p.123)

3.2.1.3 The Importance of Enterprise Management Information Systems

Over the last years, many organizations have embraced and implemented enterprise management information systems to control and manage their resources effectively and to enable them provide competitive services to their customers to keep their satisfaction. The importance of such systems comes from the complexity of these applications, work in cross-functional scope, the range of different stakeholders involved and the extent of organizational changes that are needed to adapt new business models that are introduced by the application system (Peppard and Ward, 2005). However, such enterprise systems are critical to the organizations, and it has a massive influence on their business and specifically they can play an effective role in innovation because "the enterprise information system by its nature imposes its own logic on a firm's strategy, organization and culture" (Davenport, 1998, p.126). Such system also pushes the enterprise toward integration and toward generic processes. In addition to that it can streamline the data flow within the organization and provide management with direct access to a wealth of real-time operating information, and by that the organizations become more able to manage their business in effective and efficient way (Davenport, 1998).

3.2.2 The Role of Enterprise Management Information Systems in the Organizational Innovation

Most importantly, the analysis about the relation between enterprise information systems and organizational innovation implies careful investigation to incorporate "dialectical contradictions" of the enterprise management information systems as enabling and constraining business process innovation (Srivardhana and Pawlowski, 2007, p.52).

This contradiction can be clearly seen when you find in some firms the executives try to impose the enterprise information systems as a discipline to

streamline their business procedures and polices, and to exert management control by creating generic, uniform and standard processes over the organizations. Whereas on the other organizations the executives aim by the enterprise information systems to break down such standard procedures and process, especially when these processes are rigid, in favor of creating more innovative business policies and structure (Davenport, 1998).

To deal with such contradiction, Davenport (1998, p.128) studied more than 50 organizations with their respective enterprise systems and he confidently affirms, "The companies deriving the greatest benefits from their systems are those that, from the start, viewed them primarily in strategic and organizational term. They stressed the *enterprise*, not the *system*". So this means the focus primarily on the organizational processes and it will provide sustained business value when the organizations design innovative processes then map these innovative processes through the enterprise system to facilitate the implementation. Alternatively, buying a ready-made package like ERP system, which is difficult to customize to keep the best practices as well difficult to integrate with other systems, at this stage, IT can be seen as a force for standardizing activities and by that speeding competitive convergence not enabling innovation (Porter, 2001).

On the other hand, when organizations tailor and customize their enterprise information systems to adapt with a company's unique strategic positioning, by this practice, IT becomes as a powerful tool for strategy. Thus, to gain advantage, do not adopt generic or standard solutions with its predefined processes and tailor your own enterprise systems with your own processes, and when the firms find a difficulty to apply this practice, it means they will find a difficulty to create and sustain competitive advantage by these systems (Davenport, 1998).

Take CRM system as an example, which is not only a ready-made product that can be purchased; it is a discipline, a framework, and an integrated approach to

manage the relationships with the organization's customers, which require continuous enhancement and improvement. It is a strategy, not a tactic, and although supported by IT, it will generally involve considerable organizational re-design, often changing the focus and culture of organizations (Peppard and Ward, 2005). Moreover, in a recent empirical research, Lin *et al.* (2010) investigate about the relation between the customer relationship management and innovation capability and they found the CRM that based on information technology affects positively the all five innovation types that have been examined in that research which were: product innovation, process innovation, administrative innovation, marketing innovation and service innovation. As cited in the later research (Lin *et al.* 2010) good customer relationship management (CRM) may not only retains customers but also encourages firms' customers to be involved in business development by providing important suggestions for improving products, services and processes, and it helps organizations consolidate their knowledge about customers' needs, tastes and preferences. Therefore, the effectiveness and efficiency of CRM systems nowadays are increasingly recognized as means for developing innovation capability and providing an enduring competitive advantage (Ramani and Kumar 2008 ; Sahay and Ranjan 2008).

Enhancing innovation as well as creating and maintaining a competitive advantage for companies can be emerged by using the enterprise management information systems when the companies take benefit from the accumulated data that is generated through such systems, or when the companies use the software applications of the enterprise management systems to design organizational process that can be different from the companies' competitors (Srivardhana and Pawlowski, 2007).

3.2.2.1 Enterprise Information Systems Introducing Process Innovation

Information technology can play an effective role in designing and reengineering business processes and it can enable organizations to introduce innovative business processes in three ways: firstly, by providing data flow across functional organizational levels using central and common databases. Secondly, establishing easy communication channels to improve the process performance, and finally by facilitating the process reengineering activities by modeling, optimizing and assessing its consequences using prototyping, simulation and other data flow software applications (Attaran, 2004).

Using the enterprise information systems, organizations can not only automate their business processes but also redesign, improve and introduce innovative processes taking the benefit from the systems that's work across functional departments and from the communications infrastructure. Take for example the enterprise resource planning (ERP) and customer relationship management (CRM) systems, which propose innovative organizational processes that bring real value to the organizations like reducing cost and time or enhancing the service quality (e.g. Srivardhana and Pawlowski 2007 ; Lin *et al.* 2010). The role of the enterprise systems here is not to automate the business processes only but also to introduce deep changes about how the work is done. Davenport (1993, p.46) states "If nothing changes about the way work is done and the role of IT is simply to automate an existing process, economic benefits are likely to be minimal"

It is worthy to note that, organizations who try to introduce process innovation by implementing new enterprise information systems should bear in their mind, innovation development demands introducing fundamental changes in their business process even these changes were disruptive, other wise this change in the process will be considered as business improvement and not business innovation. But that does not mean to change the entire business processes all at once, and breaking a large-scale implementation into a series of limited efforts

creates a momentum and reduces the skepticism and anxiety (Hammer, 2004). Other important issue in this regard that the information technology is enabler or supporter to organizational innovation. This means information technology is not the main driver for developing process innovation, so the focus should be drawn to many organizational issues that makes process innovation implemented successfully like the organizational change plan, the culture, the team along other organizational factors rather than to focus mainly on the advanced technology (Davenport, 1993).

As with any investment in enterprise system, the benefits from implementing CRM software are only likely to emerge when organizational processes are reshaped and redesigned. Hence, this task of business processes reengineering should not be underestimated because one of the business values that organizations obtain by implementing a CRM system, they become manage customers rather than bank's accounts, retail products and hotel's rooms and nights. By that, when firms are become more focusing on their customers by listening, responding and sharing both the desires and concerns with them, and in most cases one-to-one relationships, they become more able to develop innovate initiatives to meet customer demands (Peppard and Ward, 2005 ; Xu and Walton, 2005).

Furthermore, information technology (IT) can play effective role in service delivery as one of the organizational processes that introduced to customers. This can be clearly seen by introducing a one-point service or a one window to provide multiple services to the customers, so introducing a hybrid set of services specially in the public sector based on the wide processes that enterprise information systems provide will lead to developing innovative services (Andersen, 2006).

In this regard, to conduct process innovation properly a recent work published in the HBR emphasized that there is a link between investment in some kinds of IT and intensified competitiveness. And in order to create competitive edge and to make it sustainable, McAfee and Brynjolfsson (2008) propose a three-steps

strategy to ensure sustainable process innovation that can create competitive advantage by developing IT-enabled solutions. The three-step strategy can be summarized as follow:

1-Deploy: by adopting a consistent and a uniform technology platform to be used throughout the firm, and if there is no consistent platform that was built before to operate existing systems, attempt to re-design the existing systems to build a fully integrated IT systems in order to create consistent execution for the key business processes. Therefore, in absence of such consistent and integrated platform the firms will destroy the IT business value rather than exploiting its benefits.

2-Innovate: by introducing and designing better ways for doing the work with new innovative processes that have many characteristics like:

• Apply across as many processes as possible.

• Produce results as soon as the new IT system goes live

• Require precise instructions.

• Can be executed the same way all the time and in everywhere in the organization

• Can be tracked in real time so you can immediately go back to the older version of the process.

3-Propagate: by diffusing the newly designed process innovation widely throughout the firm. It is preferred to use IT capabilities to replicate process innovations internally and throughout the firm and to all branches and locations to create a consistent process innovation. The authors (McAfee and Brynjolfsson, 2008) , suggest using an ERP system in this step along with other Web 2.0 tools, because the importance of the ERP system emerges from as it works a central system for the overall of an organization.

Therefore, it is assumed that

H3a: Enterprise management information systems through introducing new processes can develop innovative business practices

3.2.2.2 Data-inspired Innovation using Data Analytics

The enterprise management information systems automate organizations' business processes and operations that result in huge amount of data. This amount of data along with other external data, that may generated from the internet or from other sources, is increasing dramatically which motivates business practitioners and IT researchers to speculate about new uses for this accumulated data. For this reason, Fayyad *et al.* (1996, p.38) previously state, "There is an urgent need for a new generation of computational theories and tools to assist humans in extracting useful information (knowledge) from the rapidly growing volumes of digital data". Furthermore, the Google's economist, Varian (2009) reported that wealth of information creates scare, and this scare comes from lack of attention and as cited in his article, the Psychologist Herb Simon, mentioned "A wealth of information creates a poverty of attention". Varian (2009) continues to say ".Therefore, capture someone's attention at the right time is a very valuable asset. And Google really has built an entire business a round this, because we're capturing your attention when you're doing research for something you're interested in".

Same author, Varian (2009) believes the ability to capture data and to be able to understand it, processes it, extract value from it, visualize it and to communicate it will be highly valuable and an attractive competency in the next decades. This awareness of an ever-increasing amount of data stored and the tremendous abilities of data analysis nowadays motivates researchers to explore different practices for these valuable capabilities. For example, Kusiak (2006) proposes "Data-Driven Innovation" as an innovation model, that underlying belief is new knowledge or valuable innovative ideas are embedded somewhere in the data and using data analysis tools to discover new knowledge or insight from the historical data stored within the organizations' databases or from other external sources. This new discovered knowledge can be applied in product, service, process and marketing innovations or it can be stored and shared beside other existing knowledge and ideas using knowledge management systems or any IT

communication tools to keep these ideas alive. Thereby, having such wealth of historical information since long period of time enables organizations to develop a comprehensive picture about their customers and their habits and needs, and this mature understanding may encourage different organizations to develop innovative initiatives (Peppard and Ward 2005). Moreover, McAfee and Brynjolfsson (2008) demonstrate that IT can enable business innovation by analyzing the data stored which can complement and speed up the process innovation by generating and propagating new ideas, as they state:

"Data analytics drawn from enterprise IT applications, along with collective intelligence and other Web 2.0 technologies, can be important aids not just in propagating ideas but also in generating them. They are certainly no replacement for brilliant insights from a line manager or a eureka moment during a meeting, but they can complement and speed the search for business process innovations". McAfee and Brynjolfsson (2008, p.106)

However, data analytics tools can benefit organizations in many areas. For example, the data generated from CRM system when analyzed using data mining tools, it will enable the firms to increase their sales and to offer new and better products and services (Hwang and Xu 2008 cited in Lin *et al.* 2008).
This can be done by generating a proper dataset that comes from the historical records in the CRM system beside other integrated information systems for an organization. By applying different statistical methods on the prepared dataset and using data analysis tools, it will be easily to classify the customers into different segments and groups based on their historical transactions to forecast their behaviors when the organization will propose certain innovative products, services or marketing initiatives (Lin *et al.* 2008). Another important marketing application is market basket analysis (Agrawal *et al.* 1996), which finds patterns such as, "If customer bought X, he/she is also likely to buy Y and Z." Such patterns are valuable to retailers by enabling them to design innovative marketing plans according to such insights (Fayyad *et al.* 1996, p.38). These insights are

valuable in innovation because understanding the firm's customers requires information, and this information is used to obtain a more comprehensive picture about the customers and will probably tailor relevant innovative initiatives that suit their customers and their needs along their concerns. But it is certain that any customer relationship system (CRM) needs time to collect customers' data because there is no CRM system comes with pre-loaded with a customer database (Peppard and Ward, 2005). Accordingly, the quality of this data can decide the realized value from having it and based on this accumulated data an organization can create a competitive advantage as not all firms have similar data (Porter 1985; Srivardhana and Pawlowski 2007)

On the other hand, the enterprise resource planning (ERP) systems based on its valuable capability on integration and managing an enterprise-wide transactional data, can enhance and provide more value and meaning to the generated data. This is because of the ability of enterprise management information systems in integrating different modules within the enterprise system itself, or even with other business information systems to produce a well-integrated data repository. This value can be maximized when organizations implement business intelligence (BI) tools along with the enterprise information systems that they have. By this combination between BI and the integrated data repository, organizations become more able to load all data into a consistent data warehouse or a data mart, and then apply different analysis methods such as data exploration and data mining to exploit the hidden insight beyond these data. By the result, such insight can lead the decision makers to develop innovation opportunities based on these outcomes (Chou *et al.* 2005). So because of developing data mining and data analysis applications, the huge amount of data becomes have a real business meaning, therefore, the computer applications that apply analytics tools on historical and existing data can "transform technology from a supporting tool into a strategic weapon" (Davenport 2006, p.98).

Furthermore, Roberts *et al.* (2010, p6) recently argue that organizations should benefit from the information systems they have by exploiting opportunities that data have and by responding rapidly to unseen market changes, but this cannot be easily accomplished by IT experts alone. To illustrate this, the authors give example about the electronic medical record in hospitals. They consider mining the medical record with the prescriptions data can uncover data trends on patient compliance and drug efficiency that may provide benefits for pharmaceutical companies to develop new medicines or enhance certain medicines based on the reported interaction between patients and their prescribed medicines. But in order to populate such meaning from data patterns there is a need to formulate a team from different background such as IT experts, statistical analysts, pharmaceutical experts and business leaders, and for this reason exploiting data to extract value from it cannot be easily available without close coordination and collaboration between the IT and other different business units.

Therefore, based on the above discussion, it is assumed that
H3b: Enterprise management information systems through data analytics can develop innovative business practices

3.3 Conclusion & Completed Research Model

At this stage, the research model becomes more developed after incorporating the relevant IT capabilities, that indicated in the literature and relating to the research objectives .The research model that can be shown in Figure 3.4 shows a number of IT capabilities with their respective functions and the potential benefits that can be achieved through these capabilities.
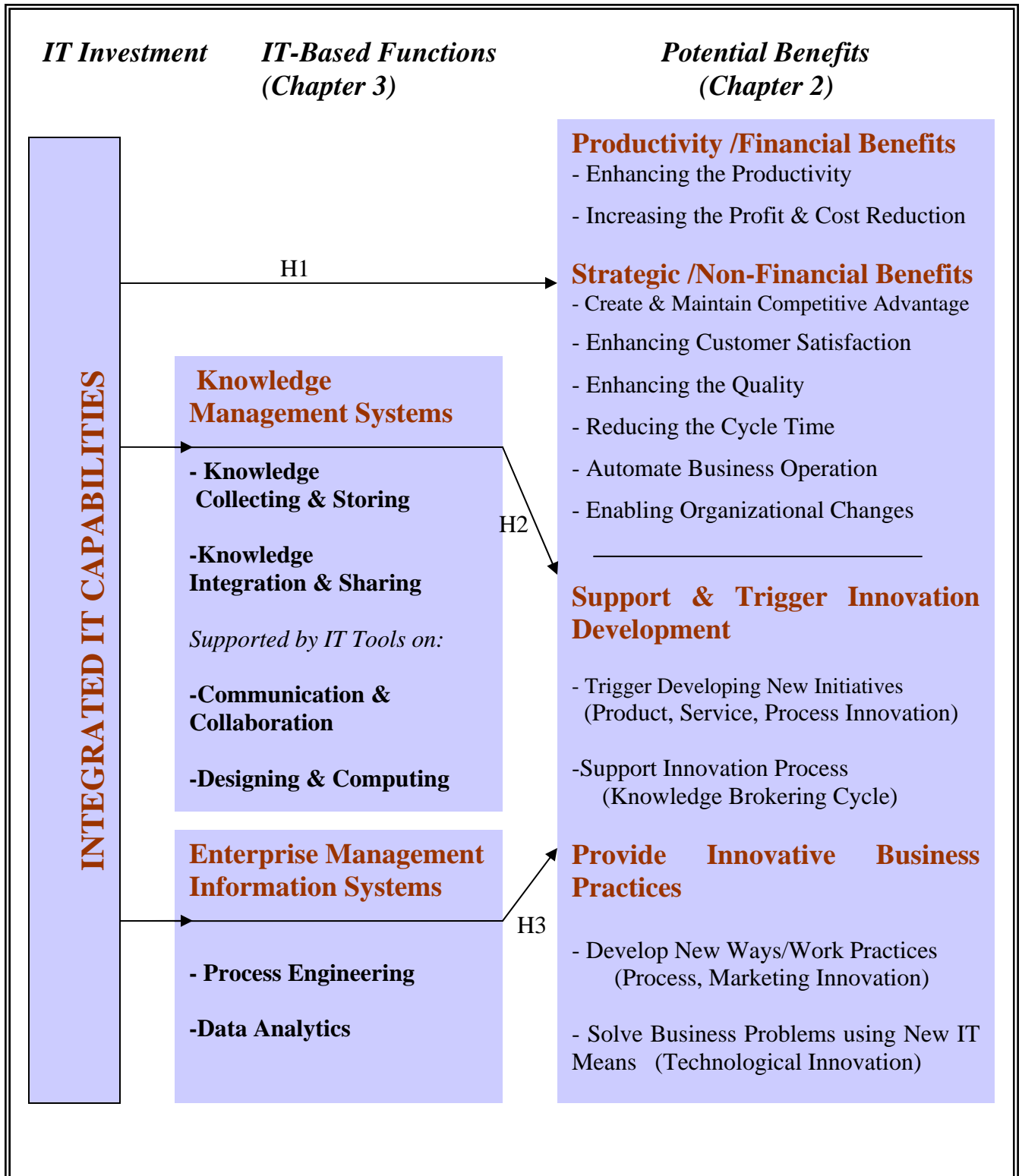
IT Investment **IT-Based Functions**
(Chapter 3)

Potential Benefits
(Chapter 2)

INTEGRATED IT CAPABILITIES

H1

Productivity /Financial Benefits
- Enhancing the Productivity

- Increasing the Profit & Cost Reduction

Strategic /Non-Financial Benefits
- Create & Maintain Competitive Advantage

- Enhancing Customer Satisfaction

- Enhancing the Quality

- Reducing the Cycle Time

- Automate Business Operation

- Enabling Organizational Changes

Knowledge Management Systems

- Knowledge Collecting & Storing

-Knowledge Integration & Sharing

Supported by IT Tools on:

-Communication & Collaboration

-Designing & Computing

H2

Support & Trigger Innovation Development

- Trigger Developing New Initiatives
  (Product, Service, Process Innovation)

-Support Innovation Process
   (Knowledge Brokering Cycle)

Enterprise Management Information Systems

- Process Engineering

-Data Analytics

H3

Provide   Innovative   Business Practices

- Develop New Ways/Work Practices
   (Process, Marketing Innovation)

- Solve Business Problems using New IT Means   (Technological Innovation)

Figure 3.4: the Research Model

Conclusion

As a result of reviewing the literature, there was a clear theoretical evidence that integrated IT capabilities can support and trigger organizational innovation. Within each one of certain capability, there are some functions that influence the organizational innovation. So regarding the knowledge management systems capability the functions that play effective role in organizational innovation are knowledge collection and storing to provide accumulated knowledge base over time, beside the knowledge integration and sharing, and these knowledge management functions can be supported and facilitated by IT-based communication and collaboration tools. Whereas the functions that are related to the enterprise management information systems that play effective role in developing innovative business practices are process engineering and data analytics, and these functions are supported by set of IT infrastructure tools that specialized in designing and computing. Now in the coming chapters there is a need to examine the research model empirically to ensure its validity.

Chapter Four: The Research Methodology

The objective of this chapter is to clarify the research methodology that was adopted in this study. Initially, there was an explanation about the process that was undertaken to conduct the research. Then, this chapter illustrates which approach and method were chosen to accomplish this study and therefore the justification for using such approach and method. Moreover, this chapter also demonstrates how the empirical data was collected, by highlighting the selected sample and the protocol that was used, and then how the collected data was analyzed.

4.1 The Research Design

In this section, it is important to draw attention in the beginning how the research was conducted and what was the process that executed to undertake this research. So the process for the research design can be described as follow:

- Identified the research objectives and questions that constitute the core of the research and the motive behind its undertaking.

- Conducted a literature review that explores the generated business value from IT investments besides the relation between specific IT capabilities and organizational innovation to formulate the theoretical framework that would be considered the scientific base which the research methodology depends.

- Constructed multiple case studies, as a qualitative research method. This was done by conducting semi-structured interviews, to collect opinions from senior IT staff about their roles, experiences and perceptions toward certain issues that regards to the realized benefits from IT and to the IT capabilities that could affect the organizational innovation.

- Analyzed and discussed the generated data from the field by highlighting the nature of the link between specific IT capabilities and the generated business benefits including the organizational innovation for every case. A

further step was analyzing the common themes between different case studies, to enable the generalization based on these findings.

- Wrote a research report that combined the theoretical background with the empirical data in order to provide the research findings as well some suggested recommendations

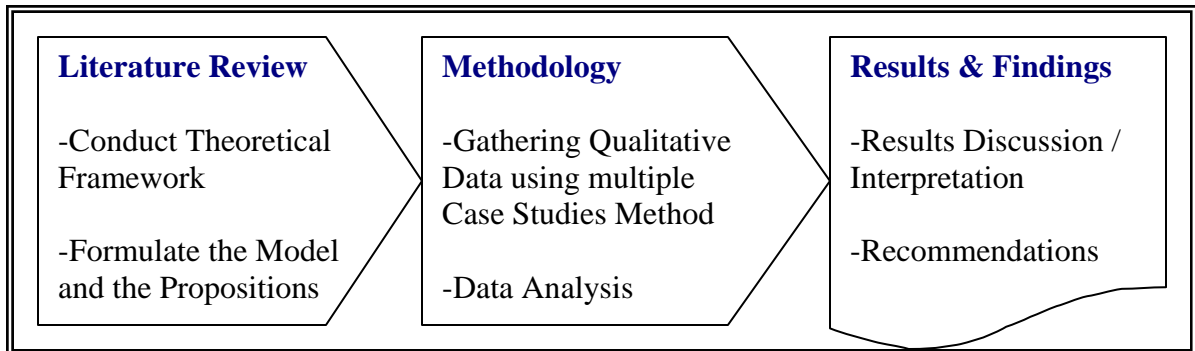Figure 4.1 shows the process that was undertaken to carry out the research.

Literature Review	**Methodology**	**Results & Findings**
-Conduct Theoretical Framework	-Gathering Qualitative Data using multiple Case Studies Method	-Results Discussion / Interpretation
-Formulate the Model and the Propositions	-Data Analysis	-Recommendations

Figure 4.1 - The Research Design

4.2 The Research Approach and Methods

In typical empirical research, the data which is collected to be analyzed is either quantitative (data in a numerical form) or qualitative (data in a nominal form such as words). The qualitative data can be understood only within a context and usually the results become with a high level of validity or accuracy and confirmed with the reality, but repeating same experiment will not necessarily provide same results. Whereas the quantitative data which is normally precise and can be captured in different points in time and different context, its results usually become with a high level of reliability which means the experiment can be repeated without differences in the results (Collis and Hussey 2009).

In this study, the main objective to do this research is to *explore* the generated benefits from the investment in IT capabilities and by the extension to focus on specific IT capabilities and *explain* how these IT capabilities can enable and support organizational innovation as one of the generated business benefits, which indicated in the literature. Because of the research approach and method

aims to answer the research questions and to meet the research objectives, the choice of research approach and methods will be guided by research questions, objectives and the available resources (Saunders *et al.* 2009).

Accordingly, the qualitative case study method was selected because in order to articulate clear understanding about the IT role within organizations and the possible relationships between different IT capabilities and organizational innovation, there is a need to describe specific organizational contexts and to analyze the environment for the organizations that participated in the research sample. But collecting data about some innovation aspects using quantitative methods will not lead to solid findings especially there is no unified understanding about innovation practices or even some IT capabilities like knowledge management. Thus, collecting qualitative data will help understanding many aspects that are related to the role of IT in general and the utilizing level of certain IT capabilities in generating business benefits including organizational innovation in particular, which was difficult to be gathered through quantitative methods. In this regard, Creswell (2007, p.73) defines the case study method as "a qualitative approach in which the investigator explores a bounded system (a case) or multiple bounded systems (cases) over time, through detailed in-depth data collection involving multiple sources of information (e.g. observations, interviews, audiovisual material, and documents and reports).."

Furthermore, Yin (2009) recommends adopting qualitative case study when the objective is to explain, explore and describe certain aspects. Especially the case study method has considerable ability to generate answers to questions like why, what and how. For this reason, a case study method is most often used in explanatory and exploratory research studies (Saunders *et al.* 2009). Other important aspect is the case study method allows investigators to maintain the holistic and meaningful characteristics of real-life events like specific life cycle or organizational and managerial processes (Yin 2009). According to that, the case study method was an appropriate method to be adopted to answer the research questions in this study.

In particular, there are three types of case studies, the single instrumental case study, the collective or multiple case studies, and the intrinsic case study (Creswell 2007, p.74). In a single instrumental case study (Stake 1995), the researcher focuses on an issue or a concern, and then selects one bounded case to illustrate this issue. On a collective case study or multiple case studies, an individual issue or concern is again selected but the inquirer chooses multiple case studies to illustrate the issue. Often the inquirer purposely chooses multiple cases to show different perspectives on an issue. Yin (2003) suggests that the multiple case study design uses the logic of replication, in which the inquirer replicates the procedures for each case. Creswell (2007, p.74) points out that "as a general rule qualitative researchers are reluctant to generalize from one case to another because the contexts of cases differ. To best generalize, the inquirer needs to select representative cases for inclusion in the qualitative study". The final type of case study method is an intrinsic case study in which the concentration is on the case itself (e.g., evaluating a program, or studying an organization having a difficulty) (Stake, 1995) because the case presents an uncommon or unique situation.

In this study, a multiple case study method was chosen because it helps to identify common patterns from multiple cases that adopted IT and considered it as a fundamental pillar in their business rather than just choosing one organization and generalize based on its practices and experiences. Thus, by using this method it can be easily decided if specific IT capability with its usage was happened in one case or it was a generic practice between many cases, at that time, it can be generalized based on these multiple occurrences (Yin 2003).

4.3 Research Scope

The research scope was the UAE organizations that provide services to customers. These organizations were representing government, and private sectors and the industry was varied from governmental services to finance and banking as well as information technology.

4.4 Data Collection

Now after choosing an appropriate research approach and method, it is required to shed light on the empirical data that was collected, by identifying the instrument that was used and highlighting who were the participants in the research and what the data that was gathered.

4.4.1 Data Collection Instrument

From the previous section, it was clear that this research used qualitative data collection method, but what was the research instrument that was used to collect the research data? , And what was the rationale behind choosing such instrument particularly?

To collect qualitative data, the face-to-face deep interview was chosen for that and generally the interviews are helpful to find out what is happening and to seek new insights (Robson, 2002 cited in Saunders *et al.* 2009). The interview instrument is defined, by Collis and Hussey (2009, p.144) as "an instrument for collecting primary data in which a sample of interviewees are asked questions to find out what they think, do or feel". Specifically the semi-structured interview, which was chosen, and where the researcher have a list of themes and questions to be covered, and sometimes these questions may be different according to every case (Saunders *et al.* 2009). The details about the interviews and the procedures to conduct them are described bellow in the interview protocol.

4.4.2 The Interview Protocol

At each case study site, interviews were held with senior IT professionals and managers. In the beginning, the interviewer introduced the dissertation objectives and informed interviewees that they have the ability to refuse answering any question. At the end of every meeting, a summary for the interview was transcribed and then reviewed with the interviewee to verify the summary's

contents, in order to ensure there was no misunderstanding between the interviewer and the interviewee. Normally the interview lasted from 45 minutes to about 90 minutes.

4.4.3 The Interview Questions

In this section, there is a list of many questions that were prepared before conducting the interview sessions, which actually were developed, based on the theoretical background. Semi-structured interview was chosen to allow the investigator to ask probes and follow-up questions. By using that, we can ensure to gain maximum information to extend our understanding about some aspects that were related to the study but they were not necessarily indicated in the pre-defined questions and these probes and follow up questions can be used when using semi-structured interview but they cannot be used within structured interviews. Probes questions defined by Collis and Hussey (2009, p.145) as questions the interviewer asked in response to what the interviewee has said to elaborate on their initial statement. In this study, follow-up questions were incorporated within the interviews to enhance the depth of the investigation like asking the interviewees to provide examples or to explain certain aspects that were related particularly to their organization's environment or context variables. Furthermore, the interview questions were designed in away to address all research questions to provide comprehensive picture from practitioners to answer the research questions and to meet the research objectives.

The interview questions were five questions with open ended and divided in away to answer the research questions that this dissertation aims to answer. The first question was designed to give a background about the organization and to understand the environment and the general context about that organization. Whereas the second question was focusing on the generated business benefits from IT in general, and the third question focuses on the specific business benefit, which is fostering and supporting the organizational innovation. The fourth and the fifth questions addressed the realized business benefits and the role of specific IT capabilities, which are knowledge management systems and

the enterprise management information systems, in the organizational innovation.

Here are the interview questions that were used to collect data:

Q1: Can you please tell me what role does IT play in the day to day running your business? How seriously the top management considers IT an important pillar or they just considering it as a means to facilitate the daily work?

Q2: In what way does IT bring benefits to your organizations? How the IT affected your customers, operation work, the corporate strategy or any other aspect? Can you provide examples?

Q3: Do you have any examples how IT was used to develop or supported the development of new initiatives or services in your organization? Did IT influence the way your organization does its business and provide its processes and services?

Q4: Could you please explain specifically how the enterprise management information systems helped your organization? Do you have any example how such systems did support developing new processes or any new business practices? Are you currently taking benefit from the historical data that you have stored? Can you give examples in what way they provided benefits to your organization?

Q5: How do you manage the knowledge in your organization? How did suggestion system or any feedback system generate benefits to your organization? (How the intranet works if exists). Are you using Web 2.0 tools in business?

4.4.4 The Selected Sample

Selecting the participated organizations as cases was based on their availability to be accessed by the researcher to ensure their willingness to cooperate and based on their adoption of many IT capabilities. These firms were medium to large organizations and, all of them are based on the UAE and have successful history, as the research objectives and questions are focusing to investigate about the IT role within the UAE.

Because the scope of this dissertation is limited to the organizations who deliver services and not who manufacture products, so selecting the participated was based under this criterion. The invitation to participate was sent to eight organizations that we think they rely extensively on IT and they can provide a great opportunity to study their experiences on using specific IT capabilities that are relevant to the research objectives.

However, the positive responses who agreed to participate in the study were five organizations. Glesne & Peshkin (1992 cited in Creswell 2007) recommend the number of case studies should not be more than four or five cases to allow proper focusing in every case, therefore five cases as a research sample is considered enough to be analyzed.

To ensure confidentiality, the name of the organizations along with the name of the interviewees are not disclosed in the dissertation based on the interviewees requests, hence, aliased names were given to every organization as A,B,C,D& E.

The people who participated mainly staff from lower to middle management. The rationale behind choosing these staff was because these people aware of the top management plans and they work to support achieving the organization's strategy through harnessing the potential capabilities of IT, while having good experience and deep understanding about certain IT capabilities and they know to what extent these IT capabilities can provide benefits to their organizations. Specifically these managers were like IT project manager, IT program manager,

head of computer applications, information systems manager and infrastructure manager.

The five cases that participated in the study were varied from government and private sectors and they are working in different industries. These cases can be summarized as follow:

Case A: is one of the most important governmental departments that provides many services to Abu Dhabi residents. This firm is employing about 300 staff members and has implemented many IT systems and most of its business work is automated and considered IT is a vital component in their business as this department is preparing many services to be used part of e-government initiative in Abu Dhabi.

Case B: is a leader company that provides telecommunication services to people in the UAE, it's a private company employs over 1,000 staff members and its core business relies on IT and allocated huge amount of money to continuously develop IT systems.

Case C: is a multinational company, its main activities are providing and implementing healthcare solutions and the main clients are governmental hospitals. In the UAE branch, there is less than 100 member but they coordinate with the main office. This organization has rich experience about the practices in the governmental hospitals as they are main providers to these hospitals.

Case D: is one of the largest banks in the UAE, providing banking services and employs more than 1000 staff member allocated in different branches. This bank is allocated huge investment for IT as their business completely dependant on information technology, currently the bank is developing new systems to provide more banking services using smart phones.

Case E: is one of a governmental firm providing transportation services in the UAE, this organization has a lot of systems that are integrated with each other

and allocating immense investments to make their work completely automated since many of their services are part of e-government.

The bellow Table (4.1) shows information about the organizations which were participated in the research with their respective sector and industry and the role of people who were interviewed within each organization.

Organization	The Industry	The Sector	Interviewee Roles
A	Governmental Services	Government	Head of information system section Systems Specialist
B	Telecommunications	Private	Project Manager Senior Data Architect
C	IT Provider of Healthcare Solutions	Government	Functional Consultant Technical Consultant
D	Finance and Banking	Private	Senior Systems Analyst Head of IT Department
E	Transportation	Government	Project Manager Senior Business Analyst

Table 4.1 – the Participant Organizations

4.5 Data Analysis

After collecting the data from the targeted participants, the followed stage was analyzing and discussing the collected data to extract the clear insight from this collected data. This section provides some details about how the data was analyzed because data analysis can provide a more obvious and useful presentation about the collected data by highlighting data associations, casual relationships and data patterns among different cases, which in turn, enable us to generalize and conclude based on these common attributes.

Generally, analyzing the data within case studies can be a holistic analysis of the entire case to focus deeply in all aspects for a case study, or embedded analysis of one or more specific aspect of a case study (Yin 2003). In this study, it was chosen multiple case study method to study specific aspects, which are related to the theoretical background, in the selected cases. A suggested format by Creswell (2007) is to provide thematic analysis across the cases that called across-case analysis, in addition to assertions or an interpretation of the meaning of the data generated from different cases.

The procedure, which was followed to analyze the qualitative data from multiple cases in this study, was adapted from two authors (Yin 2003 & Creswell 2007) that can be described as follow:

- o Started with creation of word tables that display the categorized data from the individual cases according to certain uniform structure (This uniform structure was based on the question topic in this study).

- o Developed the previous tables to incorporate additional themes or outcomes of interest that reported from different people or that represented different views including the reported comments and all other related details for every theme.(This to incorporate themes other than questions topic but it relates to the study)

- o Combined the outcome tables from previous step to create a comprehensive table, which consisted from multiple cases. This kind of cross-case synthesis will be very helpful to interpret the combined data, by contrasting and observing any common patterns between these many cases, and this analysis, in turn, enabled us to draw conclusions from these argumentative and accumulative cases

- o Conducted comparisons to assess the links between the different themes within and across cases and to examine if there were common patterns between certain sector or industry or any other noticeable findings

- Conducted comparisons between the study findings and secondary data from other data sources to examine if the findings of our study were supported or refuted from other sources

- Conducted comparisons between the data results and the theoretical background to examine if the propositions that assumed in the literature were supported, explored and explained or not

4.6 Research Questions and the proposed hypotheses

As the study aims and objectives oversee the research direction, research questions can be articulated to provide specific enquiry that the research attempt to demonstrate. For this reason research questions can make the research investigation more focused and narrowed to particular aspects (Collis and Hussey 2009).

However, one way to answer the research questions is to propose different hypotheses that can be derived from the literature and may provide theoretical insights to the research questions and then examine these propositions based on empirical data that can be collected from number of organizations (Collis and Hussey 2009).

Table 4.2 shows the study objectives along with the research questions, compared with their related hypotheses.

Research Objective / Question	Suggested Hypotheses
Objective #1: Investigate the potential benefits of investment in IT in creating and maximizing business value. **Research Question #1:** What are the potential benefits from IT investment? Are the UAE organizations effectively using IT to foster innovation?	**H1:** The returned value from IT investment can be realized through obtaining many business benefits like enhancing quality, customer satisfaction and fostering innovation

Objective #2: Examine the role of knowledge management systems in triggering and supporting innovation development	**H2a**: Knowledge management systems through knowledge collecting and storing can trigger and support innovation development
	H2b: Knowledge management systems through knowledge integration and sharing can trigger and support innovation development
Research Question #2: How can knowledge management systems be used to effectively support and trigger business innovation?	**H2c**: IT infrastructure through communication and collaboration tools can trigger and support innovation development
	H2d: IT infrastructure tools through designing and computing tools can facilitate and support developing organizational innovation.
Objective #3: Examine the role of enterprise management information systems in reengineering existing business processes and providing innovative business practices	**H3a**: Enterprise management information systems through introducing new processes can develop innovative business practices
Research Question #3: How can enterprise management information systems be used to effectively provide innovative business practices?	**H3b**: Enterprise management information systems through data analytics can develop innovative business practices

Table 4.2 –Mapping of Research Questions and the proposed hypotheses

4.7 Methodology Critique

Generally, using two independent sources of data to corroborate research findings within a study gives advantage to the research because the variety of data collection methods enhances the level of validity and reliability at same research (Collis and Hussey 2009). But this study used a qualitative multiple case study as a single data source which is a limitation in the study.

However, in this study, choosing a qualitative case study method to collect the data was a viable choice because this research aims to examine the role of knowledge management systems and the role of enterprise management information systems in fostering organizational innovation by exploring some practices that support the existing relation between these found practices and organizational innovation. Therefore, the research results that can be generated from such type of research can be more accurate by qualitative methods especially the knowledge management practices and innovation development are likely not common among all organizations in the UAE. For this reason, it is required from the researcher to establish a rationale for choosing the purposeful sample (Creswell, 2007), which was in this study based on the historical success in providing good practices in respective working fields.

But again choosing multiple case studies can dilute the overall analysis because the more cases that used in an individual study, the less the depth in any single case (Glesne & Peshkin, 1992 cited in Creswell, 2007). Therefore, having enough information to present an in depth picture of the case limits the value of some case studies, but in turn using limited number of cases affects the ability to generalize based on these small number , hence, the success of case study method require to take these consideration.

Other important issue that might affect the research findings which is there are some concerns about the interviewees themselves if they are really representing the organizations' situation and to what extent their responses are accurate.

Chapter Five: Study Findings and Discussions

5.1 Study Findings: Emerging themes and the proposed hypotheses

The study findings showed four themes that were established in different case studies and linked to the study objectives, research questions and the proposed hypothesis. These findings with their details are briefly described in the cross-case data results that are shown below in the Table 5.1.

Finding Themes	Finding Details	Justification
I- Description: There was a return value from investment in IT as IT provided many valuable benefits and it can affect strongly the core business operation in many cases	All cases that participate in the study without any exclusion highlight the vital role of IT in their business work because they can derive many valuable benefits from IT. Specifically cases A, B& D indicate that their business cannot be easily run without information technology.	H1 is clarified
	Enhance customer satisfaction by introducing fast and convenient self services using web technologies in the internet **(All Cases)**	
Address what: RQ: #1 Hypothesis: H1 Objective: #1	Enhance customer satisfaction by introducing one service point rather than many intermitted stages and sometimes in different locations using an integrated developed software application, this also results in reducing the process cost and cycle time **(Cases A,C,D &E)**	

	Automate complex business operation by coding all business rules to create unified and accurate processes based on the corporate policy and rules **(Cases A,C & D)**	H1 is explored, explained and supported
	Facilitate the internal and external communication between people by using many IT means like emails, internet and intranet sites, this reduced the cost because some work locations are placed in different areas, therefore communications through electronic means cheaper than telephone calls. **(All Cases)**	
	Providing a single unified patient record in all medical units can reduce medicine conflicts which by the result enhance patient's safety **(Case C)**	
	Using IT-based solutions, internet-based self service transactions and e-banking system reduced the number of staff and accordingly reducing the cost **(Case D)**	
	IT advances attract more customers especially those who prefer to use electronic means rather than visiting the bank site, thereby IT can create competitive advantage **(Case D)**	

II- Description:	Suggestion systems were used to collect new ideas internally from the staff and there were some innovations originally emerged from such systems (Cases A, B, D & E)	H2a is explored, explained and supported
Lack of well-developed knowledge management systems, but there were some outstanding knowledge management usages along with other IT tools that were conducive to trigger and support innovation development	Suggestions and claims systems were used to collect feedback externally from customers about their needs and concerns (Cases A, B, D & E)	
Address what: RQ: #2 Hypothesis: H2a, H2b, H2c & H2d Objective: #2	Intranet sites, portals were developed to facilitate internal knowledge sharing, and performing self service transactions (All Cases)	H2b is explored but unsupported
	E-learning was used to increase knowledge acquisition and accumulation by providing Computer-Based-Training (CBT courses) (Cases B & D)	H2a is explored but unsupported
	'SharePoint' was used to develop a document management system, to store documents and enable staff share these documents, circulations leveraged by search capability for memos, exchange opinions with external companies. (Cases B, C & D)	H2a, H2b & H2c are explored but unsupported

	Using emails, alerts & videoconferencing for communicating with each other internally and externally **(All Cases)**	H2c is explored but unsupported
	Inadequate usage of collaboration tools that are related to web 2.0 technologies such as blogs, forums and social networking tools with external parties **(Case B use it internally)**	
	Collaborate with consulting companies like Gartner and McKinsey to use their stored knowledge base and to share knowledge with consultants and experts in banking business about new products, services and processes and benefiting from the stored business practices that were suggested from the consulting companies **(Case D)**	H2a, H2b and H2c are explored, explained and supported
	When a bank decided to reengineer the existing processes, the process improvement department cooperated with IT department. They jointly used a process workflow system to design the new process and this helped them to envisage the shape of the new process with a simulation for that and highlighted the gap in that process. **(Case D)**	H2d is explored and supported

III- Description: IT-based innovations mostly thrived from either systems integration that provided new process or service, which could not be easily available without IT, or by implemented innovative IT solutions that were designed to do work in new ways	Integrating investment transactions with number of global investment indexes that extracted daily along with data from risk management to calculate the expected return and once approved, automatically the transaction will be sent by SWIFT service to respective financial institutions. This is considered as innovative process because before, there was a need to do this process through multiple sub processes. **(Case D)**	
Address what: RQ: #3 Hypothesis: H3a Objective: #3	Building a new service for visa screening to link appointment system with the healthcare system inside a hospital that was also integrated with the medical devices and sending automatically the result to the residency system that relates to external entity. **(Case C)**	H3a is explored, explained and supported
	Linking two systems, Customer relationship management (CRM) with Human resources management (HRMS) to create a new process that allows rewarding staff members who are working at call center department and closing certain number of customer calls. **(Case B)**	
	Developing new internet-based system by a bank to enable companies send their staff salaries by themselves. This can be done by uploading a file from HRMS system into the bank's website and defining the date and the	

	time for money transferred. This process was manually with some delays and errors, but recently this new system has introduced new electronic process for salary transfers. It is worthy to note that this a new system emerged from an idea from the suggestion system **(Case D)**	
	A bank developed new system for e-banking that can be used by smart phones for bush-services (like sending an account balance frequently) and pull-services (like sending a message to do a specific transaction or using the phone-based system to undertake different transactions). **(Case D)**	
IV- Description: Despite the participated organizations obtained considerable benefits from using data analytics, there was an inadequate data exploitation that leads to innovation development.	Providing a new marketing promotion schema that was specially tailored to attract customers from certain countries. This was because the analysis of historical data revealed that most of the existing transactions were made for customers from these countries **(Case B)**	H3b is explored, explained and supported
	Linking the historical data with the risk management system to facilitate decision making for future investments. **(Case D)**	
Address what: RQ: #3 Hypothesis: H3b	Linking the historical data with performance management system to show the achievement	H3b is explored

Objective: #3	level for some performance indicators and compare them with number of pre-defined KPIs. (Case B, D & E)	
	Analyzing historical data is used to identify the proper locations for ATM machines based on the nature and number of historical transactions (Case D)	
	Using data mining system to forecast the interest rate and the cash flow position in the future. This kind of analysis can give the decision makers in the bank new insights about some financial indicators in the future and based on that they request from the product development department to tailor a new product according to these insights (Case D)	H3b is explored and supported

Table 5.1 – Cross-Case Analysis for the Key Findings

Summary

The study results found four themes across multiple cases that can provide clear insight and exploration for the research hypotheses and in many cases support these hypotheses, these four themes are: Firstly, all cases that participated in the study showed that they obtain significant benefits from IT as a return value from their investing in information technology. Secondly, there was a lack of well-developed knowledge management systems, but there were some outstanding knowledge management usages that were able to trigger and enhance developing innovations. Thirdly, the data revealed that IT-based innovations mostly thrived from either systems integration that provided new processes or

services, which could not be easily available without IT, or by implemented innovative IT solutions that were designed to do work in new ways. Finally, the results showed that although the participated organizations obtained considerable benefits from using data analytics, there was an inadequate data exploitation that leads to innovation development.

5.2 Results Discussion

The case study method demonstrates different data findings that can answer the research questions and can provide insights and exploration to the research objectives along with the considered hypotheses. This section analyzes the main findings that were generated from the collected data and discuss them in the light of what have been discussed in the literature.

These key findings are:

1-Organizations may obtain significant benefits as a return value from investing in information technology.

All cases responded that there was a real value from investing in IT. For example, case A, B and D highlight that their business cannot be run without IT, so information technology was a main pillar and affecting strongly the business work in the participated firms that operating in governmental services, telecommunication, and finance and banking industries.

 A senior system specialist noted,
 "Once the server shuts down for any reason, most of the work in the firm become on hold".

A head of IT section in a bank noted,

"When we offer more advanced electronic services that can be executed by customers themselves rather than visiting the bank, number of new customers are increased and existing customers become more satisfied"

A senior business analyst in government firm states,

"Our business rules are complex and involve many details and exceptions especially calculating the fees, but when using the information system all of these details become hidden and programmed within the system. The new information system also reduces number of errors that used to happen before and put us in difficult and embarrassed situations with our customers".

Based on the above findings, it seems that all cases considered IT as an essential component to do business work. They also considered that IT can provide many significant benefits to their organizations like enhancing customer satisfaction and increasing quality of work as the business transactions become faster with minimal errors. Organizations that work in private sectors (case D) highlight the importance of IT in creating competitive advantage when they develop distinctive processes using the internet that attract more customers. Consequently, these complementary benefits affect the financial position for organizations in different ways. However, these findings support what many authors concluded, that many complementary business practices that come as a result of applying IT solutions have a major impact on financial returns and can lead to further productivity gains (Devaraj and Kohli 2004 and Dedrick *et al.* 2003).

Accordingly, these findings explore some details about the realized benefits from IT, that are assumed in H1 and these explorations may be enough to support H1.

2-Lack of well-developed knowledge management systems, but there were some outstanding knowledge management usages that may trigger and enhance innovations development

Although most cases indicated that they have no enterprise knowledge management systems, there were many significant applications that may trigger and support innovation development like suggestion systems, corporate portals, 'Sharepoint' software, document management systems, and collaboration with external experts to share and discuss some potential ideas that may be used to develop innovative solutions. This is confirmed with the Cash *et al.* findings (2008) that showed many IT-based applications like collaboration tools, integrated databases, knowledge management systems and analytical tools, electronic experts' directories, and repositories of application names with their functionalities can significantly enhance innovation development. However, it is worthy to note that in a recent interview with a research manager from Intel Corporation, Baldwin (2010), emphasized that "it is not absolutely necessary to use applications of information technology to manage the innovation process, but IT innovations will certainly make it easier".

Head of IT section in a bank said,

"When we feel there is a pressing and an urgent need to develop a new product or a service to our customers, the management formulates a team from three business units: operation, new product development and information technology departments. This team conducts several sessions with some consultants and experts in banking using these consultants website based on a subscription and using videoconferencing and by that they provide us many suggestions. At the same time throughout the development of new product or service we log into consultants web site to share with them different ideas"

In a global survey of 1700 executives from around the world that aimed to investigate the realized benefits from Web 2.0, McKinsey (2009) found that 69 percent of respondents noted that their companies had gained measurable business benefits from Web 2.0 applications, including more innovative products and services, more effective marketing, better access to knowledge, lower cost of doing business, and higher revenues. Similarly, Baldwin (2010) in her interview

stressed that chat rooms, video-conferencing, and social media websites that connect staff virtually are critical to innovation adoption, and will certainly nurture innovation development. However, the results of our work showed that all participated cases in the study mentioned that collaboration tools that are related to Web 2.0 technologies were not widely used for business purposes. The lack of using Web 2.0 in business applications may be due to different factors some of which are: these technologies are relatively new, or there was a lack of awareness about the importance of such technologies in the business, or the organizational culture does not support this type of practices in the business.

Furthermore, Baldwin (2010) asserts that simple IT tools like databases can better capture people ideas and filter information to use today and to save for tomorrow without spending huge amount of money. And she gives an example about the updated suggestion system that can store, update and filter valuable ideas which are considered the raw material in innovation process. Likewise, the results of the investigation in this study showed that suggestion systems were widely used to collect new ideas from internal staff. At the same time, the findings showed limited usage of suggestion systems to collect new ideas from external people. In other words, most organizations that participated in the study deal with suggestions from external people as feedback or complain, while suggestions from staff where reviewed regularly and linked with incentive-schema. Therefore, these firms almost obtain their innovations from internal suggestions rather than external ones. Whereas in Procter and Gamble, for example, more than one third of new products are developed based on ideas come from outside the company and mainly from their customers (Huston and Sakkab 2006)

The study findings revealed many practices that some organizations used and considered as fundamental tools for open innovation and can specifically enable the knowledge brokering cycle, which can be described as follow: Firstly, suggestions and feedback systems were commonly used to capture and store new ideas. Secondly, Intranets, portals and 'SharePoint' systems were used to

share ideas among internal staff, and this in turn could make ideas alive. Thirdly, in one organization (Case D), there was electronic collaboration with consulting companies and expert people by using electronic memberships, which allowed subscribed firms to discuss specific issues that could enable them to find new uses for some potential ideas with expert people who work in same industry. Lastly, systems like workflow, project management, and other special-purpose software tools were used by some organizations to design new processes and computing the resources that may be needed in innovation development, which helped these organizations test their innovative concepts. In this regard, McKinsey (2010a) suggested that IT can play effective role in open innovation and in its process, knowledge brokering cycle. This is because by using web-based applications it becomes easy to find solutions for specific business problems by matching internal seekers with external solvers because by using electronic social networks, for example , organizations can acquire collective know-how that reside in millions of executives brain which can help in solving some problems or uncovering certain usages.

Accordingly, using these IT-based practices by some organizations provides clear exploration and support for H2 hypotheses (H2a, H2b, H2c, H2d) which assume that knowledge management systems through knowledge collection and knowledge sharing along with some IT tools in communication, collaboration and designing can trigger and support innovation development.

3- IT-based innovations mostly thrived from either systems integration that provided new process or service and could not be easily available without IT, or by implemented innovative IT solutions that were designed to do work in new ways

The findings revealed that in many cases IT-based innovations emerged as a result of integrating an enterprise system with other system(s) or technological device(s) that created new business process or new service that could not be

easily shaped without IT. This kind of innovation was flourished because IT has strong capabilities to integrate the work across different systems and across business units to provide innovatively unified business processes. This was clear in all cases that participated in the study but most remarkably was seen in governmental organization (Case A) because the business processes were shared among different departments within an organization and sometimes shared among different governmental organizations. In fact, providing 'a one service window' or 'a one service point' was reported as an innovative business process by many cases. The same can be said about integrating CRM system with HRMS system to create new process for rewarding staff who work in call center (Case B). This is confirmed with Cash *et al.* (2008) work that consider IT's integrating role is a cornerstone in innovation development because of successful innovation mostly depends on the ability to coordinate efforts across organizational boundaries. For this reason, the later authors recommend organizations to build their systems as reusable components to combine them in novel ways rather than developing a new system just to do a limited-purposeful system.

Moreover, the findings showed that IT-based innovations in some cases emerged from building new systems to do work in different ways to leverage on IT capabilities like building e-banking system (case D) which enabled bank's customers to do their services by themselves using the internet or even using their smart phones rather than the traditional banking services. Other innovative example was creating new web system to enable organizations send their staff salaries directly from their HRMS system. This is support what Peppard *et al.* (2007) argue which is IT-based innovation can be thrived using new IT to do something it could not do before.

Based on that, these findings explore some details that address how the enterprise management information systems through introducing new processes can develop innovative business practices, which are assumed in H3a and these explorations may be enough to support this hypothesis.

4- Despite the participated organizations obtained considerable benefits from using data analytics, there was inadequate data exploitation that leads to innovation development.

The findings present evidence about using data analytics and its benefits like monitoring organizations performance (cases B, D & E) and facilitating decision-making (cases B, D & E) in addition to providing new insights that can be used in developing new processes or business practices (case D).

In a study conducted by KPMG (2008) about business intelligence in the UAE, there were only one third of surveyed organizations already have such data analysis tools and about other one third were developing or thinking to develop BI analysis tools. In that study, finance and business heads used BI tools to take decisions according to the data analysis whereas the frontline staff who provide the business services to customers cannot use this kind of analysis. However, in our study, three organizations out of five already have data analysis tools but they reported the usage from that analysis was weak. We found the main uses for data analysis tools were measuring the organizational performance, and for generating sophisticated reports for top management to facilitate their decision making, but discovery new insights and applying them in new products, services and processes was very limited and was in one case only (case D - Finance & Banking sector).

In our study when the participants were asked why they did not extract new insights from data analytics to develop them in innovative practices, some responses were:

 One senior Data Architect said,
 "When we find interesting outcomes after deep analysis of historical data, we report that to department manager but nothing occurs, simply because the new product development department proposes business cases for new products or

services based on the market analysis not from our data analysis. But still data analysis can be used to provide some statistics for the new developments".

Other Head of Information Systems said,
"Why would the IT department take the risk for proposing new insights, and later on be blamed for that if that new insights brought negative results? "

One senior Business Analyst states,
"We have many systems since long time from different vendors and different platforms, some of those systems were bought since a decade without source code, so what we can do is analyzing the data separately, because we cannot integrate all data together, for this reason the value from the analysis outcomes is limited".

Based on the above responses, it can be concluded that different reasons behind the lack of using data analytics to extract new insights are the following: Firstly, the management does not realize the extreme benefits of data analytics. Secondly, the huge work and investment needed to develop data analytics solutions. Thirdly, the organization's culture is not supporting developing new products, services or processes as a result of data analytics. Fourthly, a lack of coordinated skills needed to exploit meanings from the available data, as Roberts *et al.* (2010) maintain that extracting value from the massive amount of data requires various skills including IT skills in analysis tools and data manipulation, statistical analysis and deep business knowledge.

The lack of data analytics that was found in this study is supported with the findings of Xu and Walton (2005, p.968) that mention, "there is evidence to support the argument that organizations have not yet benefited from using analytical CRM to gain customer knowledge".
On the other hand, interesting findings from a recent study conducted by McKinsey (2010b) showed that two thirds of 739 executives, who participate in the survey, emphasized that their decisions and business processes are

becoming data-driven. 39 per cent of these executives considered the most significant benefit from data analytics is discovering new insights, whereas 34 percent to improve business forecast, and 29 percent to make business decisions more rapidly.

Based on that, these findings explore some details that address how the enterprise management information systems through data analytics can develop innovative business practices, which are assumed in H3b, and these explorations may be enough to support this hypothesis.

Chapter Six: Conclusion and Recommendations

This chapter presents a conclusion for this study and set of recommendations that can be suggested to help organizations create business value from IT. Next, it goes to provide limitations that might restrict the study work, and finally it gives suggestions for future research.

6.1 Study Conclusion

This section is to review the outcomes that have been achieved in order to articulate convincing answers for the research questions and to meet the study aims and objectives that were the reason behind undertaking this study.

Information technology nowadays is taking more focused attention and is playing more advanced role in driving business development and growth. So the aim of this study was to investigate different benefits that can be obtained from investing in IT to create business value to organizations and more particularly to investigate how fostering organizational innovation can be emerged as one business benefit from IT. Our review of the literature revealed that, IT as a coherent set of technical capabilities could provide valuable business benefits to organizations and one of these benefits was supporting and fostering organizational innovation. In the theoretical framework, it was assumed that IT could be clearly seen as enabler and supporter to organizational innovation since it is capable to collect and store new ideas then provide sharing capabilities to the interested people using knowledge management capabilities. It was also assumed that IT through implementing information systems could provide innovative business processes and through data analytics could provide innovative business practices.

In this research, it was clear evidence that IT can provide many benefits for organizations like reducing the cost, enhancing the work quality, increasing the customer satisfaction, reducing the cycle time, driving the organizational change

and fostering organizational innovation. This research proved that IT is competent to play effective role in organizations because of its ability to work horizontally across many business functions and serve them in an integrated way and in central business delivery. This was effective because every business unit has its own concerns that are related to its core business functions, but the only player that can work to oversee all of these different business functions is the IT, as it is working across different business functions.

So as a result of conducting this study and after examining the research model, there were some remarkable findings that include:

This study showed there were many knowledge management practices that effectively support and trigger business innovations. Examples of these practices are suggestion systems, corporate portals, "Sharepoint" systems, and online collaboration with consultants and expert people by using specialized websites and videoconferencing. On the other hand, the study found there was a lack of using online social networks or specialized professional forums in developing business innovations.

Furthermore, it is becoming evident that there are different aspects in IT that can foster organizational innovation, but it is obvious that IT-based innovations, which come from implementing enterprise information systems, are mostly flourished in two ways: The first one is integrating an information system with other information system(s) or integrating it with other electronic device(s) to provide a new process or practice that could not be easily available without IT, like 'one window service' or smart phones services. The other way is by implementing innovative IT solutions that were designed to do work in new ways, like e-banking or electronic payments.

The results also suggest that not all organizations have data analysis tools, and for those who already have such tools, they used them in facilitating decision-making and monitoring the performance indicators, but there was a very limited use in extracting new insights that can be developed into innovative practices.

Therefore, a considerable move towards empowering IT role is now being undertaken especially by organizations that rely heavily on IT, in order to develop new opportunities and to drive business growth. Consequently, embracing and empowering such role of IT requires more investments to develop the related IT capabilities and to better prepare the IT staff to handle the consequent work. However, these investments will not be expensive for organizations that already have developed strong IT capabilities such as enterprise information systems and integrated databases beside other IT capacities that are commonly exist for many organizations. But it is required from organizations to change the traditional view about IT to create new values from it rather than just using it for automating and speeding up business work.

6.2 Study Recommendations

As a result of conducting this study there are some essential aspects that are suggested to organizations to take them under consideration:

- ➢ It is suggested that organizations should lead their IT projects as business change projects, and not technology or installation projects; because many technology projects like ERP, CRM or any other enterprise projects come up with many practice opportunities that should be exploited such as introducing innovative processes or reengineering existing processes. And by these business changes, organizations can obtain returns for their IT investment.

- ➢ It is suggested that managing IT projects as business change projects require from organizations to adopt change and innovation in their mindset and their culture. This in turn requires strong leadership to drive and support this dramatic and deep business change, because if the IT projects are not carefully managed and controlled by business leaders, they may soon find themselves under the control of these projects.

- The organizations should adopt the recent technologies to efficiently collaborate and communicate. Since these technologies offer easier ways to collect, share, and creatively use various kinds of information, interactive discussions, opinions sharing, and know-how knowledge that are expressed in text, audio and video, as these technologies provide a tool kit and fundamental means through all phases of innovation process.

- It is suggested that organizations establish a specialized team or a business unit to horizontally integrate many business aspects and to help on proposing new initiatives, and this group should consist of many experts having expertise in innovation, process management and improvement, process simplification, and quality management. The responsibilities for this group can be coordinating between different business units, enhancing the integration across-functional business units, managing the organizational change initiatives and projects, improving the delivery of business services, and managing the innovation development.

- It is suggested that the awareness of business managers about the importance of data analytics should be increased, because when these managers realize that they can take advantage from ever-increasing pool of common, consistent and integrated data in devising new initiatives, they become more motivated to provide a high-quality data from the start. It is also suggested to expand the usage of data analytics tools to different business units and levels especially new product development business unit.

6.3 Study Limitations

As any investigation, there has been number of undeniable limitations that require some clarifications, when evaluating the study findings. Some of these limitations are:

- Regarding the methodology: As this study used a qualitative case study method, the small number of cases affects the abilities to generalize. In the section (4.7 – Methodology Critique), there is a critical evaluation for the methodology that was used.

- Regarding the research model: there is a number of important aspects that are related to IT and can influence the organizational innovation but have not been covered upon in this study. These factors like IT human resources who contribute and work closely in innovation development so these staff members require certain needs that provide them more capabilities to leverage their roles. Other important aspect is IT polices and security issues that can hinder knowledge sharing and in return affect the innovation negatively.

6.4 Further Research

Another line of research worth pursuing further is to empirically examine the research model again for this study based on quantitative methods, or replicating it in other industries like airlines aviation and insurance, as they are heavily dependant on IT and might give more supportive evidences.

Further research could also be studying the success factors that make IT really play an effective role in innovation, it is suggested to examine these factors beside others (people, culture, leadership, alignment between business strategy and technology strategy, managing IT initiatives as change management projects)

6.5 Concluding Remarks

Obviously, IT executives, IT project managers and senior IT staff could benefit from being educated so to know that information technology is now shifting to a more advanced role which is becoming as a fundamental driver in business growth and a vital player in fostering organization innovation. This advanced role requires frequent developments and a highly exploitation of new emerged trends in IT and it also requires more developments for IT staff that demands more collaboration between IT and other business units to work jointly toward more integrative, innovative and productive work.

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Appendix 1 - Interviews Responses

<u>Case A</u>

Q1: Can you please tell me what role does IT play in the day to day running your business? How seriously the top management considers IT an important pillar or they just considering it as a means to facilitate the daily work?

IT is very essential player to do the business since our business depends heavily on IT, because the business rules are coded within the system, so there is substantial budget allocated for IT.

Q2: In what way does IT bring benefits to your organizations? How the IT affected your customers, operation work, the corporate strategy or any other aspect? Can you provide examples?

IT has increased customer satisfaction as many transactions become online, and because of providing search capability for customers to allow them enquire about some details using our website, they become more satisfied.

Our business rules are complex and involve many details and exceptions especially calculating the fees, but when using the information system all of these details become hidden and programmed within the system. The new information system also reduces number of errors that used to happen before and put us in difficult and embarrassed situations with our customers

Q3: Do you have any examples how IT was used to develop or supported the development of new initiatives or services in your organization? Did IT influence

the way your organization does its business and provide its processes and services?

We have suggestion system and it is reviewed periodically, usually we find interesting ideas from our staff that really have been put in practice.

We are currently developing new IT systems to provide integrated services that will be used in the e-government, because in existing systems, when the customer finish his application, he goes to cashier to pay, but if we will put these services in the e-government site, there is a need to build a single consistent transaction.

Q4: Could you please explain specifically how the enterprise management information systems helped your organization? Do you have any example how such systems did support developing new processes or any new business practices? Are you currently taking benefit from the historical data that you have stored? Can you give examples in what way they provided benefits to your organization?

Implementing new ERP system helped us in changing the current processes to be standard overall the organization.

We used data analysis to facilitate the decision making for managers and to understand the data from comprehensive view . But we do not use data analysis to develop new matters because, why would the IT department take the risk for proposing new insights, and later on be blamed for that if that new insights brought negative results?

Q5: How do you manage the knowledge in your organization? How did suggestion system or any feedback system generate benefits to your organization? (How the intranet works if exists). Are you using Web 2.0 tools in business?

There is intranet for staff to check their employment records. There is suggestion system for staff to propose new ideas; the wining suggestion can take incentive based on that.

Case B

Q1: Can you please tell me what role does IT play in the day to day running your business? How seriously the top management considers IT an important pillar or they just considering it as a means to facilitate the daily work?

IT has top priority in our business because it depends heavily on IT. Therefore, there is considerable budget that allocated for IT.

And actually once the server shuts down for any reason, most of the work in the firm become on hold

Q2: In what way does IT bring benefits to your organizations? How the IT affected your customers, operation work, the corporate strategy or any other aspect? Can you provide examples?

IT is increasing our customer satisfaction as most of customer transactions are based on the web and customers themselves can do the transactions. This also increased the accuracy of the data as the human intervention is limited.

Q3: Do you have any examples how IT was used to develop or supported the development of new initiatives or services in your organization? Did IT influence the way your organization does its business and provide its processes and services?

Recently, we designed a new marketing promotion schema that was specially tailored to attract customers from certain countries. This was because the analysis of historical data revealed that most of the existing transactions were made for customers from these countries

Q4: Could you please explain specifically how the enterprise management information systems helped your organization? Do you have any example how such systems did support developing new processes or any new business practices? Are you currently taking benefit from the historical data that you have stored? Can you give examples in what way they provided benefits to your organization?

Linking two systems, Customer relationship management (CRM) with Human resources management (HRMS) to create a new process that allows rewarding staff members who are working at call center department and closing certain number of customer calls.

Regarding data analysis, what usually happen is when we find interesting outcomes after deep analysis of historical data, we report that to department manager but nothing occurs, simply because the new product development department proposes business cases for new products or services based on the market analysis not from our data analysis. But still data analysis can be used to provide some statistics for the new developments

Q5: How do you manage the knowledge in your organization? How did suggestion system or any feedback system generate benefits to your organization? (How the intranet works if exists). Are you using Web 2.0 tools in business?

Internal suggestion system that is specialized for internal staff to propose new suggestion to develop new service, combine multiple services, changing or introducing new process, and this suggestion is based on incentives).

Every department has shared repository, and every employee has access to this repository so they can store and retrieve but cannot update any document.

There is e-learning system enable all staff to register for certain course and attend it electronically. The request usually comes from the staff who initiates the need and the manager approve attending the chosen course.

There is a forum used by all internal staff, and by this system, any person has an idea or an issue can raise it and other people comment on that threat.

Case C

Q1: Can you please tell me what role does IT play in the day to day running your business? How seriously the top management considers IT an important pillar or they just considering it as a means to facilitate the daily work?

IT is playing essential role to the business. Significant budget is allocated for IT because our higher management nowadays realize the benefits that can be generated from IT especially when IT provides clear picture about patient records over along period

Q2: In what way does IT bring benefits to your organizations? How the IT affected your customers, operation work, the corporate strategy or any other aspect? Can you provide examples?

Providing a single unified patient record in all medical units can reduce medicine conflicts which by the result enhance patient's safety

IT enhances the productivity and shortens the time. For example, the online appointment system reduced the patient queues which made staff produce more.

IT increases the work speed and accuracy. For example, if a doctor wants to know the laboratory results, he can check that easily by the system, so the work becomes more accurate and efficient.

Q3: Do you have any examples how IT was used to develop or supported the development of new initiatives or services in your organization? Did IT influence the way your organization does its business and provide its processes and services?

Building a new service for visa screening to link appointment system with the healthcare system inside a hospital that was also integrated with the medical devices and sending automatically the result to the residency system that relates to external entity.

Q4: Could you please explain specifically how the enterprise management information systems helped your organization? Do you have any example how such systems did support developing new processes or any new business practices? Are you currently taking benefit from the historical data that you have stored? Can you give examples in what way they provided benefits to your organization?

Integrating patient record with an ERP system, especially there are many healthcare units that distributed geographically and the finance department is allocated in separate area. So the integrated system provides data consistency and fees accuracy.

Q5: How do you manage the knowledge in your organization? How did suggestion system or any feedback system generate benefits to your organization? (How the intranet works if exists). Are you using Web 2.0 tools in business?

There is no knowledge management system nor suggestion system but what we have is an intranet portal to share documents between staff.

Case D

Q1: Can you please tell me what role does IT play in the day to day running your business? How seriously the top management considers IT an important pillar or they just considering it as a means to facilitate the daily work?

IT is a very important and essential business unit for business' daily work, the most IT staff are on call 24X7 because investment department works in non typical working days. Because IT is the core for our business we have two budget types: shared budget among other different units and one for IT department alone. Very process oriented even for all IT issues, for example if a staff member wants to install certain program , he has to log a request for that.

Q2: In what way does IT bring benefits to your organizations? How the IT affected your customers, operation work, the corporate strategy or any other aspect? Can you provide examples?

Increased the quality of work, all internal processes inside the bank are based on IT, this facilitates the communication between staff by knowing the status for every process by the system, so no need to call other persons to enquire about certain issues, therefore the communication becomes cheaper and the work becomes more accurate.

Using IT-based solutions, internet-based self-service transactions and e-banking system reduced the number of staff and accordingly reducing the cost
When we offer more advanced electronic services that can be executed by customers themselves rather than visiting the bank, number of new customers are increased and existing customers become more satisfied, which by the result leads to competitive advantage

Q3: Do you have any examples how IT was used to develop or supported the development of new initiatives or services in your organization? Did IT influence

the way your organization does its business and provide its processes and services?

When the bank decided to reengineer the existing processes, the process improvement department cooperated with IT department. They jointly used a process workflow system to design the new process and this helped them to envisage the shape of the new process with a simulation for that and highlighted the gap in that process.

Integrating market data with the daily transactions so when a user enters any investment transaction, the new system compares the transaction details with the current global market indexes. And then send it that by swift service

A bank developed new system for e-banking that can be used by smart phones for bush-services (like sending an account balance frequently) and pull-services (like sending a message to do a specific transaction or using the phone-based system to undertake different transactions).

When we feel there is a pressing and an urgent need to develop new product or service to our customers, the management formulates a team from three business units: operation, new product development and information technology departments. This team conducts several sessions with some consultants and experts in banking using these consultants website based on a subscription and using videoconferencing and by that they provide us many suggestions. At the same time throughout the development of new product or service we log into consultants web site to share with them different ideas

Q4: Could you please explain specifically how the enterprise management information systems helped your organization? Do you have any example how such systems did support developing new processes or any new business

practices? Are you currently taking benefit from the historical data that you have stored? Can you give examples in what way they provided benefits to your organization?

Developing new internet-based system by a bank to enable companies send their staff salaries by themselves. This can be done by uploading a file from HRMS system into the bank's website and defining the date and the time for money transferred. This process was manually with some delays and errors, but recently this new system has introduced new electronic process for salary transfers. It is worthy to note that this a new system emerged from an idea from the suggestion system.

Analyzing historical data is used to identify the proper locations for ATM machines based on the nature and number of historical transactions

Using data mining system to forecast the interest rate and the cash flow position in the future. This kind of analysis can give the decision makers in the bank new insights about some financial indicators in the future and based on that they request from the product development department to tailor a new product according to these insights

Q5: How do you manage the knowledge in your organization? How did suggestion system or any feedback system generate benefits to your organization? (How the intranet works if exists). Are you using Web 2.0 tools in business?

'SharePoint' is used to develop a document management system, to store documents and enable staff share these documents, circulations leveraged by search capability for memos, exchange opinions with external companies.

Collaborate with consulting companies like Gartner and McKinsey to use their stored knowledge base and to share knowledge with consultants and

experts in banking business about new products, services and processes and benefiting from the stored business practices that were suggested from the consulting companies

Case E

Q1: Can you please tell me what role does IT play in the day to day running your business? How seriously the top management considers IT an important pillar or they just considering it as a means to facilitate the daily work?

IT is very important to do the business since our business is facilitated and supported by IT, but there was some business processes rely on IT because the business rules are coded within the system, so there is substantial budget allocated for IT.

Q2: In what way does IT bring benefits to your organizations? How the IT affected your customers, operation work, the corporate strategy or any other aspect? Can you provide examples?

IT Improves and enhances the quality of work because some processes was divided into many stages and some of them allocated in different places. But combining multiple stages into a single process or service is able to reduce the cycle time, increase the customer satisfaction and reduce the service cost

There are number of human resources services can now be accessed using the intranet like enquiry about the salary, leave balance and also it can be easily to apply for a leave or to print 'To Whom It May Concern' letters, so this increased the staff satisfaction and increased the HR productivity because HR people no longer needed to do such requests.

Q3: Do you have any examples how IT was used to develop or supported the development of new initiatives or services in your organization? Did IT influence

the way your organization does its business and provide its processes and services?

There is a suggestion system that is used by internal staff to propose new ideas that can be useful for business operation.

Initiate a new business service that was not possibly accomplished without IT, because it joins multiple transactions that are located in different locations like creating a new service as a unified card that can be used in all emirates rather than issuing local cards

Q4: Could you please explain specifically how the enterprise management information systems helped your organization? Do you have any example how such systems did support developing new processes or any new business practices? Are you currently taking benefit from the historical data that you have stored? Can you give examples in what way they provided benefits to your organization?

Linking the historical data with performance management system to show the achievement level for some performance indicators and compare them with number of pre-defined KPIs.

But usually it is not easy to extract value from the data because we have many systems since long time from different vendors and different platforms, some of those systems were bought since a decade without source code, so what we can do is analyzing the data separately, because we cannot integrate all data together, for this reason the value from the analysis outcomes are limited

Q5: How do you manage the knowledge in your organization? How did suggestion system or any feedback system generate benefits to your

organization? (How the intranet works if exists). Are you using Web 2.0 tools in business?

Suggestion systems were used to collect new ideas internally from the staff, there is also suggestions and claims systems were used to collect feedback externally from customers about their needs and concerns. Furthermore there is a document management system used to scan all formal documents