

Impact of e-procurement in the construction industry SMEs of Ireland

Ahmed Elsanosi

Dissertation submitted in partial fulfilment of the requirements for the
degree of

MBA in Project Management

At Dublin Business School

Supervisor: Cathal Coleman

January 2020

Words count: 17305

Declaration

It is being declared here that I made this report entirely and I am solely responsible for all aspects of this research and that it's the result of my investigation, except where it is clearly acknowledged by references. I am submitting this research report to Dublin Business School as a requirement for my master's degree.

Signature:

A handwritten signature in black ink, appearing to be the initials 'A' followed by a stylized flourish.

Student number: 10506895

Date: 1/6/2020

Acknowledgement

I am very thankful and grateful to God who gave me the strength and motivation to complete this dissertation, my supervisor due to his consistent help and support during the process of this research. My family members and friends who also have been helpful for me therefore I am deeply appreciative to them.

Abstract

The purpose of this research was to investigate and analyse the impact of e-procurement on project performance of construction SMEs in Ireland. This research has carried out primary research and quantitative research has been carried out from the project managers working different construction SMEs in Ireland. The sampling criteria used to identify the research participants was non-probability sampling. The total number of respondents who participated in the research 50. Due to time constraint and accessibility issues, not more respondents could be included in the research. SPSS has been used to analyse the statistical data. The results from primary data findings showed positive impact of different factors influencing the adoption of e-procurement in construction Industry of Ireland. The Literature review as well as primary data findings showed the impact of new technological implementation on the supply chain processes within construction industry. Additionally, it was noticed from a research study that in order to gain competitive advantage in the industry, most of the businesses are transforming their sourcing and procurement practices through electronic procurement that allow them to achieve operational efficiency, better accountability, convenience, and cost reduction.

Table of Contents

Declaration	2
Acknowledgement	3
Abstract	4
1.0. Introduction.....	7
1.1. Problem Statement	7
1.2. Research Questions	8
1.2. Objectives of the Research.....	8
1.3. Hypothesis.....	8
2.0. Literature Review.....	8
2.1. E-Procurement.....	8
2.2. E-Procurement in Construction Industry.....	9
2.3. Benefits and Challenges of E-Procurement for Construction Industry.....	11
2.4. Drivers of e-procurement in construction organizations.....	17
2.5. Analysis of drivers and barriers related to e-procurement in Ireland.....	18
2.6. E-Procurement and Stakeholder Communication	20
2.7. The role of information technology in construction.....	22
2.8. Theoretical Background	28
3.0. Methodology.....	29
3.1. Research Philosophy	29
3.2. Research Approach	30
3.3. Research Choice	30
3.4. Research Design.....	30
3.5. Research Strategy.....	31
3.6. Time Horizon	32
3.7. Data Collection and Data Analysis	32
3.8. Sampling and Population	34
3.9. Ethical considerations	34
4.0. Results.....	36
4.1. Reliability and Validity	36
4.2. Descriptive Results.....	37

5.0. Discussion	42
6.0. Conclusion	49
References	52
Appendix 1.....	56
Questionnaire	56

1.0. Introduction

Today, the rate at which individuals and organizations use different kinds of web-based information and communication technologies (ICTs) to carry out supply chain management activities is increasing (Burke, 2003, p. 132). According to Gray & Larson (2005, p. 144), the use of information technology to support the execution of business activity engenders rapid and efficient communication, exchange of a large quantum of information, integration of multimedia documents, digitalization of procurement activities, establishment of direct online payments through the Internet, and creation of virtual organizations (Daim, et al., 2019, p. 43). Burke (2003, p. 54) claim that the use of several aspects of electronic commerce (EC) is spreading across the globe. In fact, in the last two decades, interest among scholars and practitioners in the various aspects of e-commerce in the construction industry has been growing globally. One aspect of e-commerce that is gaining global acceptance in the construction industry is e-procurement. According to Gardener (2018, p. 76), e-procurement is the use of electronic communication technologies and transaction processes to buy services, goods, and works or conduct tendering for construction works. In construction, procurement is the process through which contracts relating to the provision of goods, services, and engineering and construction works or disposal services or any combination thereof are created, managed, and fulfilled (Ika, 2009, p. 122). Therefore, e-procurement in the construction industry can be described as the use of electronic communication technologies and transaction processes to support the execution of activities related to the creation, management, and fulfilment of building contracts (Bredillet, et al., 2010, p. 211).

1.1. Problem Statement

The introduction of inventions and new technologies should encourage business development and translate this development into greater economic growth. All recent changes in technology have led to a paradigm shift that will allow all business processes in the industry to work. Online acquisition is an important solution for the purchase of the construction industry. As all large companies have adopted new and improved electronic acquisition systems based on growth, most SMEs must adopt new methods of treating suppliers instead of using traditional methods (Ika, 2009, p. 144). With the introduction of eProcurement in the construction industry, SMEs have the advantage of surpassing their competitors and have forged better relationships with their suppliers. The following study will focus on the use of eProcurement

in the construction sector in Ireland. It also addresses the problems and challenges faced by SMEs after the adoption of electronic acquisition methods (Kerzner, 2006, p. 328).

In the construction sector, purchasing plays a key role, since material logistics and suppliers are essential for construction companies. Online purchases can be described as online purchases of vendor materials (Daim, et al., 2019, p. 133). Online purchases make the process more efficient and dissociate the different levels of authority between authorities and suppliers. The online shopping approach establishes a direct link between authorized agencies and company suppliers. In addition, it helps establish an appropriate and effective direct relationship between project managers and suppliers. Today, most companies, including large and medium-sized ones, are adopting online acquisition methods. With the growing popularity of technology, online shopping is playing the most important role in online shopping in the construction industry.

1.2. Research Questions

1. What is the impact of strategic e-procurement policies on project performance in the construction industry in Ireland?
2. What benefits E-procurement provides in construction project management in Ireland?

1.2. Objectives of the Research

- To investigate the current practices of construction SME's in Ireland related to E-procurement
- To explore the benefits of e-procurement for construction project management
- To determine the impact of E-procurement on project performance

1.3. Hypothesis

- E-procurement can have a positive impact on project performance in construction industry of Ireland

2.0. Literature Review

2.1. E-Procurement

Over the years, project management has undergone tremendous change. Organizations that focus more on internal service capabilities dedicated to regular multi-service service capabilities to outsourced services (Abeyasekera, 2003, p. 122). Information technology (IT) helps many organizations improve their operational efficiency by providing Internet-based solutions for their supply chain networks and electronic solutions. Since the late 1990s, many

new e-commerce technologies have emerged that have revolutionized working methods and threatened existing business models. Because of this change in the use of electronic commerce in the market between companies, companies around the world have introduced new technologies and applications for the supply chain. Online shopping facilitates the understanding of online purchases from companies and suppliers (Bartunek & Seo, 2002, p. 23). In other words, it is electronic commerce for project and business management. Over the years, companies have used long-standing traditional methods to buy products and equipment from suppliers through intermediaries and other sources (Bayraktar et al., 2019 p.134). However, under the rule of the Internet and technology, online acquisition is one of the simplest and most complex methods to buy free hardware. Online acquisition is a fully web-based B2B purchase. With the development of technology, the use of online shopping has also increased. At the same time, most companies use PC and Internet for all their purchases. Online acquisition is one of the most powerful tools that companies can use to change the purchasing power of companies and organizations. ICTs or ICTs are one of the key factors in electronic contracting. For most projects worldwide, online shopping is one of the most important tools used by most companies (Bayraktar et al., 2019 p.143). The use of ICT not only helps companies around the world to benefit from online shopping, but also improves business models through ICT capabilities (Abeyasekera, 2003, p. 155).

The electronic acquisition tool was first introduced in 2000, when IBM introduced the resupply management system. The electronic acquisition method was originally developed by Mexican engineer Daniel Delfin. Due to his invention, he is known as the IBM Purchasing Director. The process began in Mexico to address some of the key complex problems facing the acquisition process (Walker and Brammer, 2012 p.176). As one of the largest production bases for laptops in the world, the complexity is very high. To solve this problem, the company was using electronic contracting at that time. After IBM successfully introduced online purchases, the company reached \$ 3.6 billion in three years. After the success, they began to implement the process in Germany. Each success will lead to the sale of licenses worldwide. Later in 2018, the European Union introduced electronic contracting as a binding tool for companies. This means that all public procurement is done electronically (Bartunek & Seo, 2002, p. 143).

2.2. E-Procurement in Construction Industry

The ability to implement EPS is essential. The motivation of competitors to improve EPS is excellent. The conclusions of Soares-Aguiar and Palma-dos-Reis on the introduction of the SPE are the following: The electronic acquisition system has a horizontal and vertical impact

on the supply chain (Abawi, 2013, p. 231). Earnings per share affect different areas of supply: horizontal trade, management, and market creation. From a vertical point of view, EPS supports the needs of incoming and outgoing modules, as well as inter-organizational modules. It connects to the IT systems of suppliers and buyers through the gateway of the company's IT system. IT infrastructure, knowledge of IT, knowledge of B2B, company size, disposition of business partners, successful implementation of competitors and acceptance among competitors are important factors in the introduction of the PSA. The fixed range does not distinguish EPS users from non-users because there is little difference between EPS users and non-users. The implementation factors are not the same to explain the importance of the acquisition of EPS by the company (Johnson, 2009, p. 254). According to Soares-Aguiar and Palma dos Reis (2008), the most important point is the experience in computer science and the size of the company, which is the highest standard, due to the importance of classifying the introduction of electronic procurement systems. Secondly, IT infrastructure and business-to-business knowledge are very important, and secondly, the disposition of business partners is another important factor in the implementation of electronic acquisition systems. In summary, they believe that the main activity is that professional organizations are more inclined to establish electronic purchasing systems than organizations that produce and provide services (Allison, 2018, p. 322). As a result, companies with superior IT infrastructure, IT experience, and B2B knowledge are more likely to implement electronic acquisition systems. In addition, the provision of business partners will pave the way for the introduction of electronic procurement systems. Even competitors that have been very successful and benefit from the introduction of electronic acquisition systems can encourage other companies and competitors to develop electronic acquisition systems (Hoong & Lin, 2017, p. 209).

Colander (2003 p.344) has examined the key factors that affect the success of the implementation of electronic contracting in the public sector. They noted that, despite government efforts in the context of electronic contracting reforms, the adoption of electronic contracting remains a major challenge for many contracting functions. The results also show that the successful implementation of eProcurement establishes a feedback system and mechanism. They combine online shopping with better purchasing performance. Cooper & Schindler's (2003 p. 91) study on eProcurement shows that it facilitates the documentation of the bidding process, thus increasing transparency and accountability, particularly in public procurement. The survey also revealed that online purchases are related to improved efficiency and acquisition processes. Other benefits of electronic contracting include increasing customer satisfaction, improving the professionalism of the acquisition function, and increasing public

awareness of the acquisition function. Huppert (2010 p.44) discovered that online acquisition solutions could improve customer satisfaction, contract compliance, supply chain capacity, reduce inventory costs, and improve inventory management. The team has identified the key to the success of online shopping. They stressed that electronic purchases should not be seen as a strategy; but that the organization needs to have a plan and that, the implementation of electronic purchases should begin with a benchmarking test. The implementation of electronic contracting must be supported by other functional departments. Previous research has shown that online shopping is the global agenda for electronic administration. One of the definitions indicates that the implementation of electronic contracting complements the electronic government system of a country (Scheduler, 2007 p.191). This is part of a new integrated acquisition approach that has been introduced to improve the sustainability and performance of project implementation (Nawi et al., 2014, p.341). The theoretical understanding of eProcurement has been defined as a general model of the system. Another more precise definition of online acquisition is to understand the role of information technology with software and hardware in the execution of the acquisition process, knowing that the function of software and hardware is that the concept of online acquisition Purchases are easier to understand (Borins, 2002, p.332). Online shopping is a modern way to shop online between companies with electronic tools such as the Internet and email. In addition, it helps provide and provide online distribution services using Internet-based technologies. Another definition is the exchange of goods and services between suppliers and buyers through the Internet and computer applications. Kishor et al. (2007, p.32) Defines online shopping as the use of information and communication technology (ICT) on the Internet for one or more strategic transactions or purchasing activities.

2.3. Benefits and Challenges of E-Procurement for Construction Industry

Construction industry has experimented with e-procurement and has gained fruitful outcomes (Abawi, 2013, p. 133; Bernard, 2009, p. 43; Bredillet, et al., 2010, p. 432). Companies need to improve their internal processes to improve their overall performance. The purchase process is an important and expensive process that creates a considerable administrative burden on the interface between the buyer and the supplier (Abawi, 2013, p. 87; Abeyasekera, 2003, p. 422; Adam, 2008, p. 65). A strategy to reduce these costs is to minimize the complexity of the acquisition process (Burke, 2003, p. 143). As a result, in practice, many companies have implemented electronic acquisition systems in the past (Bredillet, et al., 2010, p. 154). According to the literature, e-procurement can help construction companies acquire products

and services with the lowest total cost of ownership. In addition to reducing the costs of the delivery company, customer integration also generates higher conversion costs for the purchasing company (Saunders, 2009). This results in higher customer retention rates and makes it more difficult for competitors to reach customers from suppliers. Customer integration can be achieved by connecting the buyer's business information system to the provider's B2B (provider to company) interface. Through B2B integration, customers can place orders through their own information systems, which are passed directly to suppliers. To provide this service, the provider needs to know which interfaces are compatible with the client (Richer, 2014, p. 154).

Although online shopping offers all the benefits, the implementation of this application remains difficult. According to Noor Raihan and Zaifuddin (2002, p.54), the experience of some local service providers in launching electronic purchasing projects has put enormous pressure on companies, including lack of infrastructure, global competition, human resistance to change and policies contradictory (Adam, 2008, p. 111). Finally, suppliers can attract more foreigners, which increase costs. In addition, the main challenge for other buyers in the buyer community is that suppliers are reluctant to share information publicly with all members of the supply chain by including all information in an electronic catalogue (Ackroyd & Hughes, 2010, p. 43). Globalization and the rise of the Internet have created markets without barriers, offering unprecedented opportunities for buyers and sellers (Richer, 2014, p. 77). Due to the excessive complexity, controlling the purchase process by conventional means can be very inefficient and endless (Kerzner, 2006, p. 309). The use of electronic means in shopping can be beneficial, saving a lot of time and money. In the most common definition, electronic contracting means simplifying the acquisition process by eliminating paper documents and partially or totally completing the acquisition process through a Web-based communication system (Richer, 2014, p. 401). However, the exact definition of electronic contracting is still under discussion. For some authors, the email order is also part of the electronic acquisition, while others draw a line when they place orders through an online store, while some subscribers only request software that is used in conjunction with the online store. Research discussed about the electronic exchange of acquisition data (EDI) for the acquisition process. Tatsis et al. For example, defines electronic contracting as "integration, management, automation, optimization, and empowerment of the acquisition process of an organization that uses tools, technologies, and web applications." E-procurement simplifies and improves the multi-level purchase process for a company and includes the following features: Enterprise Resource Planning (ERP) on the Web, online shopping, so-called electronic offers, and / or integrated automated purchases.

System (QCHEM, 2017, p. 123). The definition of electronic contracting includes not only electronic orders, but also auctions and presentations through intranets and extranets, markets and / or EDI exchanges...

A study conducted by Gardener (2018, p. 112) found that among those who have used e-Procurement systems and applications to execute e-Notification, e-Exchange of information and e-Submission of project information and data, the most commonly used applications were e-mails recording 48%, 53% and 31% of the respondents, respectively followed by websites and portals (Kerzner, 2006, p. 12). This shows that a greater percentage of the respondents used e-mails to exchange project information and data. Notably, e-mail and websites have been identified by Laryea and Ibem (2014, p.12) as network technologies that facilitate the transfer and/or exchange of project data and information among participants in construction projects. It is also consistent with the finding by Rankin et al. (2006, p.70) in the Canadian AEC industry showing that e-mail and websites have been extensively used in responding to bidding opportunities and transferring bidding information and documents electronically. Apart from e-mail and websites, the study also identified the use of portals and cloud-based systems such as Microsoft Share Point and Web 2.0 technologies; suggesting that the respondents are using e-Procurement tools supported by systems located in their premises and those in the clouds (Abeyasekera, 2003, p. 133). It was interesting to find that 10% of those who claimed to be using Web 2.0 technologies in construction procurement activities used applications such as blogs and instant messaging, mainly to communicate, and share information on the availability of tender opportunities, construction materials, and equipment. This is line with the finding by Laryea and Ibem (2014, p.133) as previously highlighted. In a research study, the similar observation is found, focusing on the reduction of process cost, service cost, and price of the material through online procurement strategies and policies by the construction companies. It is beneficial and effective for the business to manage inventory in warehouses more accurately through e-procurement (Allison, 2018, p. 98). Similar articulations were found in a study that production process depends on the effective procurement process of the raw material and supplier as the professionals keep track of the inventory more carefully in online methods of procurement and dealing with suppliers online becomes more efficient, proactively managed, as well as performance of procure-to-pay business cycle is improved (Shivaraman, et al., 2013, p. 80). A research study found out that electronic procurement of raw material is a new trend in construction businesses, which is monitored and controlled through different transaction processing systems aligned with analytical systems such as demand forecasting triggers the purchase requisition, and quickly the material is procured in the warehouses (Creamer &

Backes, 2014, p. 54; Mose, et al., 2013, p. 65). Christopher (2016) research showed that E-procurement has improved price comparison and ease the negotiation process from suppliers causing decrease in prices and information management and tracking is managed effectively as well. Allison (2018, p. 121) similarly noted in a research that e-commerce trend in the world has transformed the way of doing businesses as they used to be done traditionally and with e-procurement, cost-effectiveness is achieved and less overhead and maintenance cost is incurred in the business:

It has been found by Christopher (2016, p. 54) that accessibility of suppliers becomes easier with e-procurement and in with quicker procurement; lead time of manufacturing is decreased. It was found in a research study that by enforcing different policies of e-business practices in the company, the business capabilities are enhanced and success is achieved. Suppliers' accessibility is increased having many options for the business and one of them is selected based on different factors such as price, legalities, trade duties, geographic region, suppliers' reputation, and business needs (Trkman & McCormack, 2009, p. 53).

Furthermore, it has been observed that with efficiency in operations, employee satisfaction is achieved as well as their workload is decreased because the process of procurement from requisition to order fulfilment becomes quicker and with fewer errors. E-procurement practices are performed through information systems mainly, which make the transactions more error free and accountability of each transaction for each supplier and material is increase immensely, which leads the business to become more efficient as well as competitive advantage is gained by the company (Angeles & Nath, 2007, p. 132). It was observed from a research article that strategic supply chain management processes and practices are influenced significantly by e-business practices and strategies, which is useful for the construction business to comply with industry trend and achieve strategic benefits for the business and compete effectively and equally with other construction companies in the industry (Allison, 2018, p. 54; Shivaraman, et al., 2013, p. 564). As noted by Angeles & Nath (2007, p. 43), Just-in time procurement is performed mainly through e-procurement, which saves cost, management overheads, simplification of process, and quicker delivery of finish goods that increase operational efficiency. A research study shows that through Just-in-time procurement method, less space in the warehouse is needed and faster stock turnaround is achieved. The warehouse and inventory management process becomes easier for the employees (Trkman & McCormack, 2009, p. 132). Moreover, it was found that through e-procurement, limited inventory is procured, which is why material wastage is reduced to a great level. The faster

turnaround of stock also helps the business professionals to prevent the raw material becoming obsolete or damaged in the storage space for a long time and wastage is reduced (Mose, et al., 2013, p. 32). Some studies also showed some research on contrary to the findings of this research. For example Christopher (2016, p. 123) was of the opinion that the issues of e-procurement can be leakage of information, compliance of online contracts, and risk of security through online procurement. In addition, Angeles & Nath (2007, p. 11) found similar notion that confidentiality issues are multiplied when business practices are performed online. The use of information systems create a risk of hacking, intruding in the system, theft, and misusing information from digital platforms easily. The impact of financial loss as well as data leakage can be severe for any business (Shivaraman, et al., 2013, p. 122). Moreover, in a research, it was stated that lack of alignment in jurisdiction can lead to different issues and risks related to security, and legal liabilities are increased because different countries have different legal structure, practices, transaction cost, and the companies may be unfamiliar with international laws, and therefore they may face unexpected liabilities. The disputes also occur due to different geographies as well as legal jurisdictions (Trkman & McCormack, 2009, p. 321).

The protection and security of information system, payment details, etc. is important for any business to achieve and shared systems, network resources, and often web servers are used commonly by suppliers and other parties that is the reason of security attacks, threats, and viruses (McCue & Roman, 2012, p. 154). The data integrity is a serious issue, which needs proper management to ease the procurement process online. According to a research, legal liability is the responsibility and duty of care that a company owes to its parties. The legal liabilities may be in terms of payments for damages if one of both parties does not perform their business, functions well (Allison, 2018, p. 231). The suppliers are quite concerned about the issues of legal relationship and liabilities as there have no patterns and models for the liabilities and contractual terms between both parties such as government agencies and suppliers. Due to inexperience in the new area of e-procurement, the contract can be transformed or certain clauses will be omitted for the businesses for better risk management (McCue & Roman, 2012).

Allison (2018, p. 111) stressed that the companies should make effective policies for international procurement because of the increasing trend of globalization and global sourcing from low cost countries. Globalisation these days is a part of businesses and organizational profit is defined largely by its purchases and procurement process is one of the most important processes for the construction businesses to achieve success (Shivaraman, et al., 2013, p. 20). The construction businesses need to have effective policies to that they can understand more

about their potential suppliers and select them to do business. The sourcing strategies are new trend and bring new opportunities for the domestic businesses in Ireland to get benefit from international businesses in less cost and better materials (Allison, 2018, p. 40).

Furthermore, Williams noted that the construction companies need strategic business policies for their supply chain management process and in order to make the policy to be effective, the company's first task is to search for overseas suppliers capable of satisfying their needs. According to Christopher (2016, p. 121), it was stated that there are three important criteria for the companies to consider while involving themselves in e-procurement functions that are design, cost, and time. The global sourcing strategies provide businesses means to intertwine the criteria for their benefit. The global marketplace allows the contractors to achieve value for money to highest extent without compromising on the material quality. The competitiveness of the business is achieved through better service of the suppliers (Allison, 2018, p. 143).

By undertaking an online procurement strategy, improved competitive position, global attitude, lower prices, enhanced company image, better availability, better quality, higher level of technology, advanced technology abroad, negotiability, can be achieved (Adam, 2008, p. 1232). It was found in a research study that there could be different business factors that allow the companies to adopt global procurement strategies such as improved prices, high quality of material, new exposure of the market, good reputation of the suppliers, etc. Moreover, the reason why global sourcing is effective for the business is because local buyers are designated by different corporate units for their assistance, international purchasing office is also made for them often and e-procurement to specific world-wide unit of the business becomes easier (Sparrow, 2013, p. 32).

It has been studied in a research that there can be different challenges of global e-procurement or sourcing strategy but the benefits and opportunities are more that is why leading construction businesses worldwide select global procurement strategies to deal with foreign benefits and utilise the effectiveness from globalisation having wide variety of goods, services, and quality of raw material (Angeles & Nath, 2007, p. 1232). The manufacturers consider this as an effective strategy to make global relationships in the form of e-procurement with suppliers (Mose, et al., 2013, p. 33). The world is effectively becoming smaller in business terms due to advances in IT, thus competition on the Ireland's construction firms will intensify, and in near future, it will become normal to utilize the global marketplace rather than stick to the domestic markets for e-procurement functions. As per a research article, there are many opportunities for the business to grow and become recognisable internationally, e-procurement from global

suppliers is one of them, where a range of benefits for construction companies are achieved and quick management and dealing with suppliers help them in attaining edge over the competitors (Angeles & Nath, 2007, p. 154).

2.4. Drivers of e-procurement in construction organizations

According to Charles Hoong & Lin (2017, p. 89), in the cost of all construction work, there is a 40-45% cost of construction material. In this regard, the cost of construction can be reduced by the adaptation of e-procurement initiatives. Correspondingly, the cost of middle-men distributors can be eliminated with the used of e-procurement in the operations (Bartunek & Seo, 2002, p. 315). After the adaptation of the electronic procurement, the contractors in the construction industry can directly contact the material manufacturers or suppliers with the help of a software or any electronic facilities (Bredillet, et al., 2010, p. 643). The electronic procurement saves the time and cost of both the parties (seller and buyer). Additionally, direct procurement reduces the excessive cost, and the relevant material is acquired as per the specification of the clients (Kassim & Raphael, 2009, p. 422). The practical practice of the efficiency of electronic procurement is observed after the case (in a pilot interview of research) that after the implementation of the e-procurement for managing the supply chain operation and executing the procurement practices, the minimum cost is recorded in Bill of Quantities (BOQ). This case highlighted as a practical benefit for the company (Shivaraman, et al., 2013, p. 11; Daim, et al., 2012). Moreover, it showed the significance of the electronic business initiative to procure materials for construction (Abawi, 2013). The other driver for e-procurement in the construction company is the reduction of time (Daim, et al., 2012). The other aspect is to minimize the number of organizations that are participating in the supply chain (Angeles & Nath, 2007, p. 32). The involvement of a few organizations allows for tighter integration of the supply chain. Furthermore, it provided that effective deployment meet the project's aims and requirement, and it executes effective control (Ackroyd & Hughes, 2010, p. 76). Furthermore, with the use of the internet in operations, there is a chance to upsurge the market share. The accumulation of the possible buyers and supplies that can match the specification. Correspondingly, an electronic marketplace gives the platform to the buyer to negotiate because the buyer has multiple options in considering the supplier or manufacturer of the material (Sparrow, 2013, p. 44).

2.5. Analysis of drivers and barriers related to e-procurement in Ireland

According to Eadie (2007, p. 33), the major drivers of e-procurement in cause improvement in communication, reduction in the administration cost, price reduction in tendering, gaining competitive advantage, reduction in time to the source material, reduction in inventory, and operating cost. Furthermore, it helps in the reduction of staffing levels in procurement negotiating unit cost reduction, augmentation in the accuracy of production capabilities, enhancing in inventory management, and enhancement in the cost reduction (Angeles & Nath, 2007, p. 132).

Assistance in communication acts as the highest driver to perform effective operations (Bartunek & Seo, 2002, p. 44). The assistance in communication enhances the operations as to an improvement in compliance, improvement in the visibility of the supply chain, and improvement in the visibility of demand (Allison, 2018, p. 643). The analysis regarding communication shows that non-collaborative and poor communication can create distress in the construction industry (Eadie, et al., 2007, p. 22; Bredillet, et al., 2010, p. 54). According to Angeles & Nath (2007, p. 643), reduction in the administration cost considered as the other major benefit after the adoption of e-procurement in the construction industry. In this regard, Angeles & Nath (2007, p. 674) states that the application of electronic procurement in the construction industry can reduce up to 42% of the purchasing transaction costs. On the other hand, Kohli (2003, p. 24) stated that there are limited studies regarding the impact of e-procurement on the administration cost, however, it is obvious the using this technology reduces the administration costs in the operations. According to Bartunek & Seo (2002, p. 11), with the help of the e-tendering system, the cost of documentations can be reduced up to 4.7% of its original cost. Additionally, 2.6% of the original cost can be reduced in a typical term contract. According to the research by CITE (2001) on Water Service Northern Ireland found out that 90% administrative cost is saved after adopting electronic documentation (Allison, 2018). Moreover, a reduction in inventory cost cannot be ignored in implementing e-procurement practices in the construction industry (Shivaraman, et al., 2013, p. 2334; Eadie, et al., 2007, p. 123). According to the research conducted by the civil engineering sector, it was observed that effective procurement practices help in reducing the cost of inventory (Angeles & Nath, 2007). Price reduction in tendering is the other benefit and driver of the success of the task. According to Angeles & Nath (2007, p. 54), the application of e-procurement reduces administrative cost more as compared to a price reduction in tendering. On the other hand, the adaptation of e-procurement in construction companies creates a competitive advantage for the

business. The contractors who are active in operating electric technologies can gain a competitive advantage. According to Christensen (2013, p. 543) competitors do not see the current RSNI system when doing the contract, however, effective execution of operation can act as a significant part. Moreover, the implementation of e-procurement assists in enhancing decision-making and improving market intelligence. According to Kassim & Raphael (2009, p. 453), the impact on decision-making and improving the market intelligence are two separate drivers of the effective business operation. However, reliable decisions based on procurement cannot be made without market intelligence. Additionally, according to Adrienne (2011, p. 12), advance management of inventory enhances the accuracy of operation and helps in cost reduction by negotiation.

According to the study by Wong and Sloan, it is observed that 48% of project managers successfully implemented electronic procurement to execute tasks effectively (Pierre, 2010, p. 67). This result showed that 52% of project managers failed to implement e-procurement in their construction companies. In a further elaboration, if the barriers to e-procurement are considered, it is observed that the company's culture, poor IT infrastructure, poor upper management support, and costly IT implementation can act as barriers (Hoong & Lin, 2017, p. 121). Additionally, lacking in technical expertise, lacking security transactions, interoperability concerns, lacking in the relationship with suppliers (providing e-procurement), legal and economic factors can act as the barrier in implementing e-procurement in operations (Allison, 2018).

According to Kerzner (2006, p. 132), information and communication technology helps in collaboration and connectivity in the construction industry. However, 26% of respondents were agreed that during construction, ICT is acceptable as a written proof rather than an electronic information exchange. Similarly, Gardener (2018, p. 142) states that electronic information exchange can be considered as a hurdle to implement an electronic procurement system. The other barrier that impacts the application of electronic procurement is the company's culture and attitude of the upper manager in executing the operations. According to Eadie (2007, p. 133), traditional procurement operations can face distress to solve complex situations. In a further elaboration, the barriers to executing operations arise in the bureaucratic dysfunctionalities, a large volume of paperwork, absence of a clear national policy of information technology, lacking in information quality, lacking inflexible centralized control and resistance to change. According to Gardener (2018, p. 44), resistance to change is the major problem in the human resource of the organization. If the employees or upper managers are not in favour

of the change, they will not be able to execute their complete effort in it (Gray & Larson, 2005, p. 132). Similarly, to implement e-procurement, the culture of the organization must be changed (Hoong & Lin, 2017, p. 54). According to the research, it is found out that 60% of respondents are not resilient to accept change. The other barrier to the e-procurement is lacking in the infrastructure of information technology (Eadie, et al., 2007, p. 66). In this regard, the first barrier is that the company has poor IT-based technology, which creates difficulties in adopting e-procurement. The second barrier is that most of the construction companies are unable to adopt the IT system because it is costly. The third and last barrier in implementing new technology is that employees do not have the skills to adopt it (Koster, 2016, p. 121). Correspondingly, lacking competent and skilled workers and lacking e-procurement knowledge create the hurdle in the qualified application of advanced technologies (related to IT and e-procurement) (Creamer & Backes, 2014, p. 76). Similarly, interoperability concerns cannot be ignored. Every software is unique so companies find difficulties to correct the error, in this regard, CITE (Construction Industry Trading Electronically) was introduced to avoid the technical issues (Angeles & Nath, 2007, p. 12).

2.6. E-Procurement and Stakeholder Communication

Gray and Larson (2005, p. 11) define communication as a process of interaction between individuals who create and share a meaning. Gardener (2005, p. 4) recognized that the term "communication itself" is a complex term that can mean different things in different contexts and contexts. This is certainly the case in the construction industry, where each project requires communication among a large number of participants. There is no doubt that communication plays a vital role in the effectiveness of the organization (Daim, et al., 2012). While managers in different sectors perform different tasks and activities, people realized that they were communicating most of the time. Koster (2016, p. 65) emphasizes the importance of communication with managers and emphasizes that communication skills are essential for success. Bredillet et al (2010, p. 54) points out that a large percentage of the problem of labour relations is due to lack of communication. It is also important to keep in mind those engineers and technicians spend between 50% and 75% of their time communicating verbally (Ika, 2009; Larson & David, 2017, p. 543).

E-procurement is an electronic way for companies to communicate with each other through the Internet between project managers and suppliers. The term "online shopping" is a process of buying on the Internet, such as buying a payment, which is one of the traditional commercial

methods. In addition, several traditional methods are foreseen, such as the selection of suppliers, bidding and orders and final payment methods, which are also implemented by electronic payment (Daim, et al., 2019, p. 66). In addition, online purchases cover other aspects of the process, such as bidding, purchases, tenders, delivery of goods and services, and must be done in the right place at the right time. By using IT, companies can make better and more efficient decisions to properly manage their growth and make the whole process less complex and faster to access regular information. Also, be sure to reduce the number of problems caused by errors in the manual documentation. According to Burke (2003, p. 543), communication is the compilation of all relevant information, information and materials that may be needed to effectively disseminate the deduction process. Communication is essential for anyone involved and affected by the project. The communication defined by Daim et al. (2012) is data processed in a format and presents that gives it meaning. Larson and David (2017, p. 55) stated that the members of the project team must work together to exchange, collect, and integrate information and knowledge to achieve the project's objectives. Therefore, it is necessary to understand the communication process. At the simplest level, the communication consists of three parts: the transmitter / transmitter, the channel / medium of transmission and the receiver. The fourth component, the means of communication, is the code that sends the message (Gardener, 2005). Gray and Larson (2005, p. 132) stated while explaining the process of communication that it is the transmitted message passes from the sender through the transport channel / is coded verbally or non-verbally to the recipient, which decodes the message of the message transmission medium. Similarly, Burke (2003, p. 111) emphasized that in order to ensure effective communication, all components must strive to avoid misunderstandings. The sender is the starting point of the communication cycle and is used for communication. The reasons for communication in the management of projects, requests for information, sending information, questions, which indicate the formation of a team or a network (Daim, et al., 2012, p. 542). The success of communication depends mainly on the ability of the sender to speak, write, discuss, and listen (Gray & Larson, 2005, p. 1234). Koster (2016, p. 54) stressed on the fundamental role of feedback in communication. If there is a lack of feedback, whether delayed or not so quickly, actions are needed to improve communication. However, Gardener (2005, p. 42) stated that the communicators of its implementation must be continuously monitored and verified to form the basis of the evaluation of its communication processes and the success of its system. Therefore, the recipient of the message must confirm their understanding; otherwise, the communication may be invalid (Meliha & Nermina, 2017, p. 23; Larson & David, 2017, p. 123; Lock, 2007; Olivier, 2012, p. 21)

Communication management with the help of e-procurement includes the processes necessary to ensure the timely and accurate generation, collection, distribution, storage, recovery and distribution of project information (Shahram, 2014, p. 67). Effective project managers spend approximately 90% of their time communicating with team members and other project stakeholders, either internal (at all levels of the organization) or external. Therefore, Effective communication through e-procurement closes the gap between different project participants, combining different cultural and organizational contexts, different knowledge and different points of view and interests in the implementation or results of the project (Yeates. & Cadle, 2004, p. 78). Project managers use different means to communicate in order to provide information. For the project manager, it is important to communicate the information correctly for the first time to avoid errors in the communication process. Important factors include how the communication project is managed, including the flow of information to and from the project. There must also be a clear and precise communication plan to manage the nature of the responsibility and communication of the project (Bredillet, et al., 2010, p. 133). The communication plan, and the project plan, is an essential part of the project. However, when organizations and project teams often consider the role of project managers in communication planning, they only consider specifying the frequency, roles, responsibilities, recipients, and communication channels distributed throughout the project. If the project manager does not go beyond the written text and the plan created at the beginning of the project, the project will be lost. While it is important to understand who participates in the project, it is equally important to understand what information is needed and what information should be received (Sparrow, 2013, p. 55)

2.7. The role of information technology in construction

In an organization, information technology plays a vital role in the coordination and communication between the stakeholders of the business (Björk, 2003, p. 44). Additionally, in the construction industry, IT acts as a productivity enabler for the firm. Information technology is defined as the use of electronic programs and machines for the storage, transferring and presenting the information, e-procurement, global sourcing, and program for processing (Kohli, 2003, p. 34). Additionally, the use of information technology in an organization can be performed by networks, software, computers, e-mails, fax machines, mobile applications, mobile phones, and telephones. The advanced technology has a profound influence on how the

firm functions daily. Additionally, if the diversity in operations is considered, construction industries are the most information-dependent industry of all time (Kassim & Raphael, 2009, p. 755). The diversity in operation can be explained as the cost analysis, budgeting reports, risk analysis, planning schedules, contract documents, and contract documents. Additionally, the amount of information, which is generated during a project epoch, can be considerable even for a small-sized construction venture. (Pierre, 2010, p. 133). By executing information technology into the construction procedure, most areas can turn out to be progressively effective and thus the business can do development. Additionally, in the growth procedure, two strategies that may enhance use with the use of IT are Global Sourcing and Electronic Procurement (Björk, 2003, p. 132).

According to the department of environment IT Strategy for construction, application of IT in the construction companies is common because of high investment is required (Kassim & Raphael, 2009, p. 44). Additionally, the identification of the problems in the part of neither unique not new in the construction sector. Moreover, it is a global problem, which is faced by the organization all around the world. Correspondingly, most of the companies find the evolution of the techniques more costly (Björk, 2003, p. 132). According to the Kassim & Raphael (2009, p. 448), organizations simply use the strategies and techniques to help the business decision that has already been made. Furthermore, Björk (2003, p. 66) says that IT investment and its political investments helps in recognizing the issues that is why individuals or firms may wish not to involve in the formal evaluation of the IT project. However, other organizations follow the formal appraisal systems, which is based economic analysis (Kohli, 2003, p. 134).

In the construction process, the incursion of IT also creates problems. According to Kassim & Raphael (2009, p. 9), there are both threats and opportunities for the construction companies, if the change in the technology happens. The advancement in technology can be helpful for construction-based companies to execute operations more effective and efficient. However, alteration in technology can create a financial loss for businesses (Kassim & Raphael, 2009, p. 67). Björk (2003, p. 78) argued that although financial loss damage the financial activity of the business but also loss in a human asset can create a negative impact on the companies' image. Additionally Lippert (2006, p. 15) says that the professionals become unnecessary as IT makes proficient output. However, IT makes the operations easy such as linking up with the clients at anytime and anywhere by email, software, or phone calls.

For adopting new technologies, economic and political analyses are performed. Kassim & Raphael (2009, p. 34) claims that most of the businesses and public sector agencies are in favour of adopting e-procurement technology.

The value of information technology in business helps in enhancing the performance of the business (Björk, 2003, p. 234). According to various researchers, the value of information technology plays a significant role in the progress and development of the organization (Pierre, 2010, p. 133). The value of information technology can be defined as the tool for the progress of the firm. Moreover, the value of IT can be defined as the ability to support business goals (Kohli, 2003, p. 21). The information technology can advance the operations of the business, which makes the worth in the global market far faster than a traditional operation do. In this regard, businesses have to implement hardware and software for getting their job done (Kohli, 2003, p. 133).

For decades, many empirical studies of information technology in dealings have struggled to comprehend the worth gain through information technology investment (Björk, 2003, p. 143). However, despite massive investment in information technology, the outcomes have been inconclusive and found little or in development in productivity. In the IT implementation, there is a limitation in operation execution (Björk, 2003, p. 133). According to the Lippert (2006, p. 142), the value of information technology may vary according to the methodology, industry or chosen evaluation. The value of IT investment in the construction industry is even more complex due to the nature of the project (Lippert, 2006, p. 132). The areas where IT can be implemented are end-user requirements, financing, and inter-organizational relationship management. These factors of IT implementation can be used in construction industries as well (Kassim & Raphael, 2009, p. 76). The area for managing the complex casual chain in the construction industry quality improvement and cost-saving in the operation. The operation management of the construction companies is more complicated as compared to other industries. Additionally, to provide a meaningful comparison, there in the benchmark. Specifically, there has been lacking inconsistency in the conversion of the manual procurement process to the electronic procurement process for the innovation and enhancement in the business (Björk, 2003, p. 99). According to the Pierre (2010, p. 97), IT has been frequently employed as an act of assurance without an understanding of how the business value from investment can be exposed. According to the Lippert (2006, p. 143), the operations are executed by the asset value and business value. The asset value is the acquisition of new technology in the business. The adaptation of the new technology can act as a productive

foundation for the progress of the business. The asset value typically acts as the implementation of software and hardware that keeps the business operational (Kassim & Raphael, 2009). Business value is the aspect, which acts as beneficial for the productivity of the business (Kassim & Raphael, 2009, p. 13). Moreover, the business priorities impact service delivery and business model. Additionally, the business value happens as a supplement to the shareholder's worth, which delivers a greater picture of an organization's true value (Björk, 2003, p. 154).

The industries observe that there must be an advantage in employing the innovation in the business operation, the however business has neither been able to predict what these reimbursements are after the investment has been done (Kohli, 2003, p. 176). According to Pierre (2010, p. 188), in construction companies, an effective procurement system is necessary to perform operations effectively and efficiently. In this regard, e-procurement can be used in any way in the construction areas. The e-procurement can be used in the bulletin boards, workflow management, document imaging, and e-mails to enable business process reengineering. With these combinations, e-procurement can give rise to several welfares to the strategic position of a firm. Additionally, e-procurement assists in consolidating the purchasing practices that will lead to better service and greater discounts from the suppliers. The implementation of e-procurement in operation accelerates the flow of important information between suppliers and buyers. It eases the operations and frees the workers to do other work (Björk, 2003, p. 108). The traditional method of procurement creates difficulties in managing relevant cost and benefits. However, e-procurement eases the process of improving auditing, tracking the order, and enabling staff to manage the workflow more effectively (Kassim & Raphael, 2009, p. 187). The e-procurement in construction industries assists in eliminating the time-zone obstacles. Moreover, e-procurement can be used at anytime and anywhere in a day. The practices of e-procurement operation assistances in identifying the uncertainty concerning the implemented or planned operations. The other services of e-procurement are better decision-making, executing qualified products, and data analysis (Björk, 2003, p. 154).

The weakness in the e-procurement is collecting the fragile or private information and uploading on cloud/database. The other weakness is security threats to the businesses. Additionally, the area where resistance in industrial operation is observed is lacking in the framework to measure the value of information technology in the construction companies. Additionally, lacking in the IT in industry result the scepticism in the operations (Björk, 2003, p. 176). Currently, BMC helix is the most common operational software, which is used by construction companies. It is the first and only end-to-end service that is incorporated with 360-degree intelligence (Kohli, 2003, p. 109). This IT helps in managing the information on the

cloud. This software provides service in automation in RPA bots and conversational bots, a cloud-native micro-service platform for businesses, operation based services (procurement, IT, HR and facilitates), etc. Additionally, there is other software that is made for customized use, such as electronic procurement for construction companies, etc. helps the operation to run smoothly. The application of the e-procurement is proliferating in the contemporary construction business. Additionally, there are numerous empirical studies, which are providing anecdotal evidence to support the idea of e-procurement that it assists in executing the procurement operations more effectively and efficiently in the firm (Kassim & Raphael, 2009, p. 195). The other benefits of e-procurement are, it reduces the costs of the operations, executes a qualified operation, increases responsiveness, creates product innovation, reduces the time in the purchasing cycle, creates market expansion, creates user satisfaction, and creates managerial effectiveness (Kohli, 2003, p. 102).

The empirical studies provide an insight into a singular situation (Björk, 2003, p. 109). However, they get flop to deliver a comprehensive and complete list of advantages and associate the cost, which is a benefit to the construction industry (Kohli, 2003, p. 11). As it is explained above that, the e-procurement software is made on customized format, so the choice of procurement strategies must be according to the organization's business model or specifications. Similarly, the choice of procurement strategies plays a vital role in the flow of the construction process. Hoong & Lin (2017, p. 187) argues that although e-procurement software plays a vital role in the performance of the operations still it does not encourage the innovation and fragment industrial operations. Correspondingly, the selection of a suitable procurement strategy must be applied based on the suitability of the project. According to Björk (2003, p. 12), there is a correlation between the cost and time of the operation and the procurement strategy. In further elaboration, electronic procurement strategies are design and management, traditional procurement strategies, collaborating, and construction management. The choice of e-procurement strategy is dependent on the type of project, for an instant, the method of work of the contractors or the preference of the clients (Kohli, 2003, p. 20).

The application of electronic facilities is beneficial for business practices. According to Kiabhani Yeates. & Cadle (2004, p. 1343), the adaptation of advanced technologies in businesses attracts the practitioners and researchers. Correspondingly, the involvement of technologies revolutionizes the process of procurement. Many companies are using e-procurement in an attempt to influence this technological infrastructure (Abawi, 2013, p. 13). However, before the advent of electronic-procurement in construction companies, the

Electronic Data Interchange (EDI) (which is based on inter-organizational information system) is used to share data with trading partners (Abeyasekera, 2003, p. 12). The EDI acted as the technical dais, which is rooted to set standards, which empowers informational exchange among participants or stakeholders in a marketplace (Angeles & Nath, 2007; Mose, et al., 2013, p. 187). Similarly, knowledge management plays a substantial role to mobilize the assets of the organization, which assists in facilitating the effective and qualified deployment of the competencies and organizational skills, and these competencies are implemented through knowledge management initiatives. The knowledge management helps in addressing the issues of organizational structure and culture that are seen to be possible hurdles to the qualified implementation and adaptation of e-procurement procedures in the construction organization (Mose, et al., 2013, p. 143; Shivaraman, et al., 2013, p. 165). There is a critical need for knowledge management in construction companies because they are known for change resisting entities. Furthermore, in adopting the advanced working process (e-procurement system), the internal resistance is obvious. The major factor of that internal resistance is the competency skills of workers. Furthermore, the employees do not understand the advantages associated with automating processes of procurement, and then there will be lacking in the security and confidence to adopt the new technology (Koster, 2016, p. 154). In this regard, there will be delays and reluctance in using the electronic procurement system. The knowledge management system procedure assists in investigating the other non-technical concerns which help in scheming the awareness programs for the organization (Shivaraman, et al., 2013, p. 76). The non-technical challenges are industry fragmentation, lacking in investment, reluctance in decision-making, inability to break the traditional business model and business practices. Such an approach also assists in encouraging the learning environment, which aims in meeting the need of the organization (Trkman & McCormack, 2009, p. 165).

Knowledge management allows real-time knowledge to be shared, exchange, implement, and captured through a common global network with the help of the e-procurement system (Adrienne, 2011, p. 143). The operation of e-procurement provides low cost and efficient environment to the business. E-procurement initiatives assist the construction organization to access suitable technical information from the internet regarding the suppliers. For the construction companies, it is signification to maintain the budgets (Angeles & Nath, 2007, p. 432). In this regard, the e-procurement initiative can support the formation of new associations and alliances with the new service and product supplier who can add to the value of the delivery of the service and product (Shahram, 2014, p. 154). Furthermore, with the help of e-

procurement, there is good communication and information flow between the parties involved. It is significant to create connectivity with all the parties to create better communication, quality in documents, speed of work and better financial control. In this regard, it seems that construction companies are getting eager to participate in e-procurement systems because it creates effective and efficient outcomes (Pierre, 2010, p. 132).

2.8. Theoretical Background

According to the Madden, (1992), many theories have been developed about e-procurement in the different industrial sectors. The adaptation of services, applications, and technologies from information and electronic systems is a form of technical innovation in the construction sector. However, Kohli (2003) describe electronic procurement in the construction company as a form of innovation. The existing studies have shown that there are many problems in the adaptation of the advanced technology for operations (e-procurement) which can be elaborate by using theories that are related to technology acceptance, innovation adaptation, organizational management, and reason action. The diffusion of innovation theory by Roger, the theory of reasoned action (TRA), technology acceptance model (TAM), and technological organizational and environmental (TOE) model are considered relevant to the study of the adaptation of e-procurement in the construction companies.

- Diffusion of innovation: This theory helps in understanding that there are number of factors impact the innovation such as communication channels of diffusing e-procurement, the nature of construction company, the perceived attributes (observability, complexity, compatibility) of e-procurement technology, type of innovation-decision in adopting unit (collective operational and authority) (Robertson, 1967).
- TOE: this theory says that many factors affect operations such as organizational, technological, and environmental factors. This theory deals with analysing technological factors that deal with emerging and existing technologies within technology (Lippert, 2006).
- TRA: This theory aims to explain the relationship between behaviours and attitudes within human action. It is used to predict the behaviour of the human (Madden, et al., 1992).
- TAM: It is an information system which is used to identify how and when user comes to accept the new technology. In this theory. The behavioral intention is observed which leads people to adopt and use the technology (Hoong & Lin, 2017).

3.0. Methodology

The methodology section is helpful for the readers to understand different components of the research that will be used to find out answers for the research question. Methodology section will be written in simple words so that technical as well as non-technical readers are able to understand. In this section, the approaches, methods, strategies, etc. will be discussed to have an understanding of the research performed. The results will be drawn from the collected data and conclusion will be made based on the findings and discussion of the research.

In order to explain the research methodology used in this study, Saunders onion has been used as seen in the figure below:

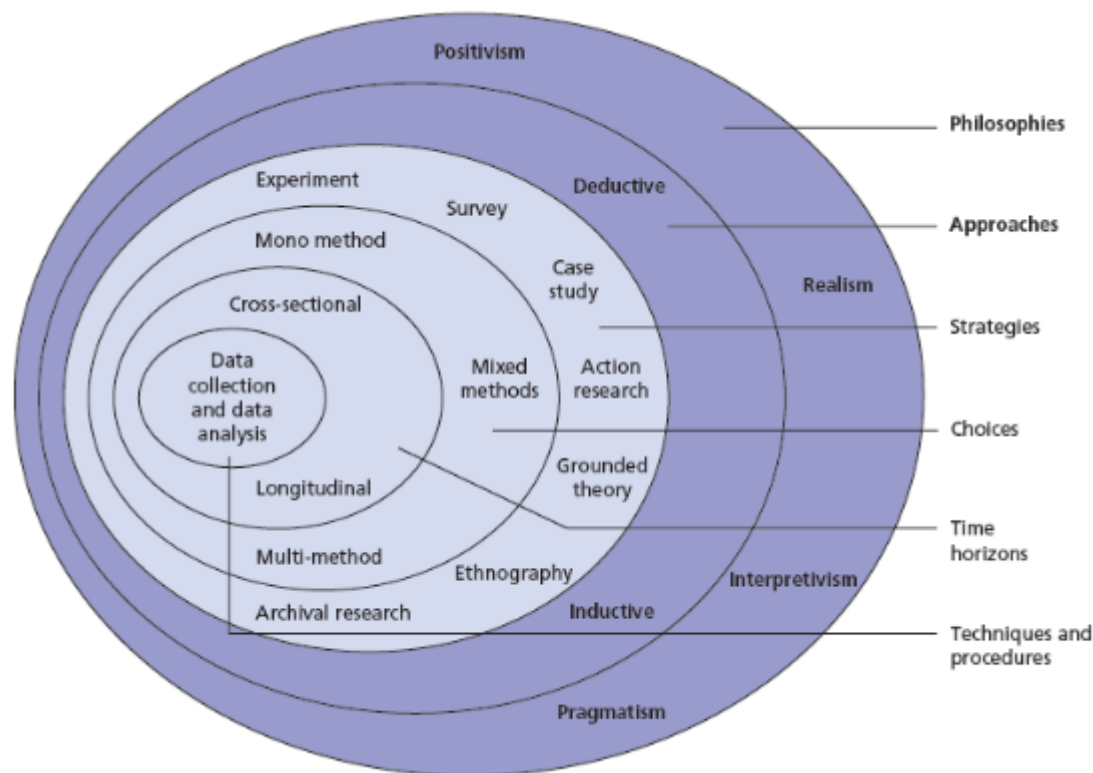


Figure 1: Research Onion, (Saunders, 2009)

3.1. Research Philosophy

Research philosophy is the foremost aspect of conducting a research. It explicates the methods and techniques employed to develop knowledge and to determine the meanings (Saunders, 2009, p. 132). This research has used interpretivism research philosophy or research paradigm to the conduct the research. Since the research outcomes are dependent on the perception of project managers in construction industry and research questions will be answered through the

perspective of project managers, therefore it involves profound interpretation of data by the researcher.

3.2. Research Approach

The research approach and methods should be known by the researcher. There are two main types of approaches that are inductive and deductive approaches. In inductive approach, the observations are conducted for the case generalisation and situational analysis (Adam, 2008; Saunders, 2009, p. 144). The inductive approach of the research is called usually downward and upward approach of the research. On the other hand, the deductive approach is used to examine different issues, challenges, and impact of the any subject with respect to theories and previously conducted researches (Abeyasekera, 2003; Carrie, 2007, p. 233). The deductive approach focuses on testing the hypotheses and finding results from the hypothesis. In this research, deductive approach will be most suitable to test the impact of independent variables on the dependent variable of the research. The strategy chosen for the research is survey strategy out of different types such as evaluation, experimental, descriptive, grounded theory, etc. The nature of this research is quantitative and the research is therefore based on survey strategy to gather quantitative responses and results from the procurement employees in the SMEs of Ireland. It is important to follow an appropriate research procedure so that there will be lesser probability of errors and mistakes.

3.3. Research Choice

This research is quantitative in nature and survey would be conducted in order to collect the data. Therefore, mono method quantitative study is the research choice for this study.

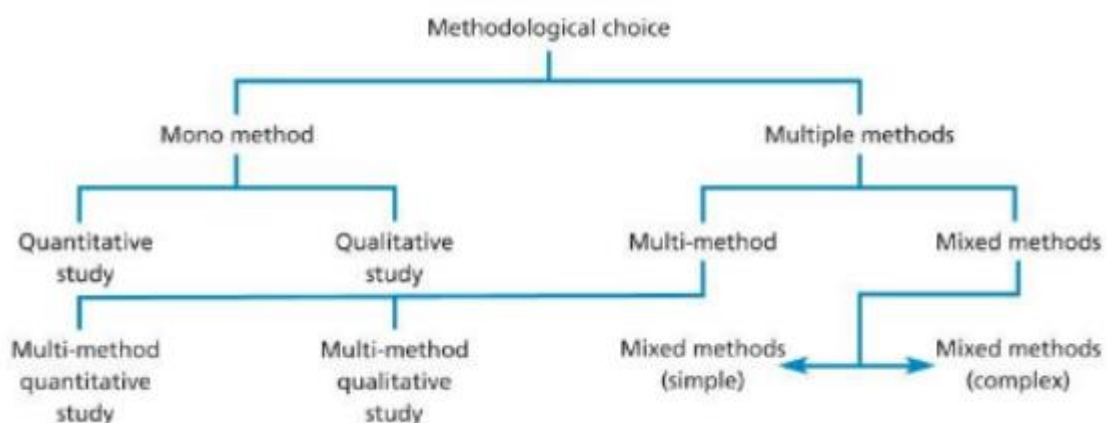


Figure 2: Research Choice, (Carrie, 2007)

3.4. Research Design

The independent and dependent variables of the research are:

Independent variables:

- Attributes of Technology
- Internal/Organisational factors
- External/Industry factors

Dependent Variable:

- E-procurement adoption

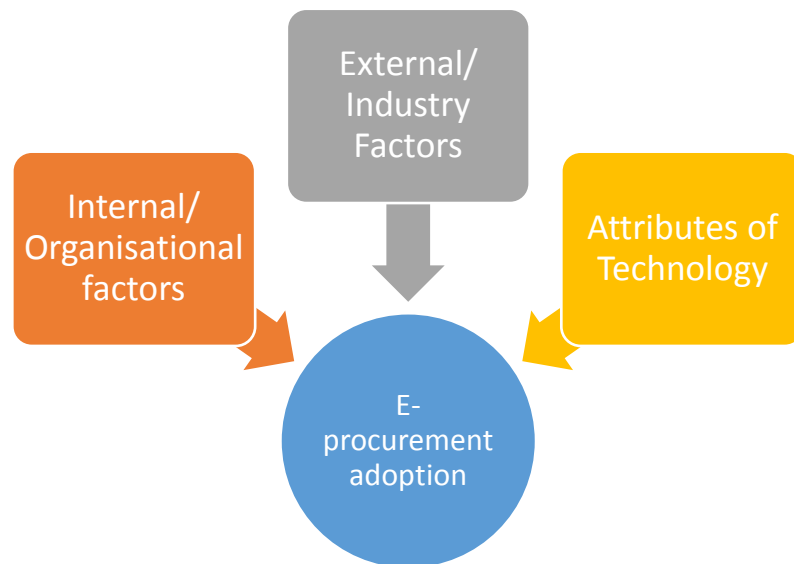


Figure 3 Conceptual Framework, (Allison, 2018)

The design of the research will show the relationship and impact of independent variables on the independent variables whether internal or organisational factors, external or industry related factors, and e-procurement technological attributes influence the adoption of e-procurement in the SMEs or not. The research design shows that only mono-method will be used to conduct the research (Abeyasekera, 2003). The cross-sectional study will be performed to analyse the impact of e-procurement on the SMEs within construction industry in Ireland.

3.5. Research Strategy

The materials used in the research are research questions, data set of the responses, previous researches, published material such as journal articles, books, reports, websites, etc. The research material includes all type of material, which is utilized and generated in the research scope (Carrie, 2007; Saunders, 2009, p. 243). Moreover, this research study is quantitative in nature using questionnaire survey strategy as their primary data collection approach. For the researcher, the data and information of the respondents, questionnaire for research participants, access to internet, Microsoft office, word document, and excel sheet is necessary to use.

Moreover, for the questionnaire, Likert Scale strategy will be used to gather the responses of the participants in orderly form. The respondents have to choose the options that support best to match their opinion. The Likert scale-based questionnaire is effective to measure the attitude of the participants by measuring the level to which they may agree or disagree with the statement or question asked to them. The number of questions asked to them will be at least 10 and maximum 20 (Abawi, 2013; Schonlau & Ronald, 2001, p. 32). The respondents of the research have to choose one of the scales as their responses. The participants of the research will be informed about the objectives of the research and importance of the research academically. The responses of the customers are taken either through face-to-face or online through Skype or telephonic conversation. The participants are expected to respond by giving rating to the scale. The scale consists of strongly agree, agree, neutral, disagree, and strongly disagree. The responses from the participants of the research will be gathered and listed in Excel sheet as raw data, which will be interpreted using any statistical software.

3.6. Time Horizon

The use of a suitable time horizon will be associated with the choice of a research strategy whereby it is necessary to select the appropriate time horizon as part of this study (Saunders, 2009, p. 164). The selection of time horizon depends on the research question. There are two types of studies that are Cross-sectional; and, longitudinal. Cross-sectional studies involve a specific phenomenon at a particular time. Meanwhile, longitudinal studies are related to change and development. This research uses cross-sectional study as it deals with specific phenomena at a time.

3.7. Data Collection and Data Analysis

The research procedure consists of the eight steps (Gorman & Johnson, 2013, p. 143). The first step is to define problem statement and significance of the research. Here, the objectives of the research will be identified. The research problem will be analysed in the next step through literature review to understand what other authors and researchers have concluded in their research about the same or similar research problem. The next step is to clarify the problem and set a target to achieve by the end of the research. The fourth step is to define the concepts and terms clearly which are used in the research. The fifth step is to identify the population of the research and what sample will be used to gather the data of the questions. The sixth step of the research is to develop hypotheses and questionnaire for the participants based on the research questions and hypotheses both. Moreover, the data collection process will be performed, in this case survey through the designed questionnaire to gather close-ended and

specific answers from the respondents. After that, the raw data from the respondents will be analysed using analytical and statistical tools (Johnson, 2009; Gorman & Johnson, 2013; Ackroyd & Hughes, 2010, p. 43).

The analytical or statistical tools are based on the mathematical models that help in expressing different set of assumptions or hypotheses statistically to generate the interpretation of the raw data into meaningful form. The statistical models use the responses of the respondents and relate the numbers using various equations and find relationship between the variables based raw data. The statistical model is also known as representation of the theory formally. In this research, the hypotheses are tested statistically using SPSS software for both independent and dependent variables of the research (Schonlau & Ronald, 2001).

The variables of the research need analysis technique such as regression and correlation to find the relationship of independent variables on dependent variable. The techniques used to analyse whether the data is true for the sample of specified set or false (Gorman & Johnson, 2013, p. 52). The result in hypothesis testing is either accepted or rejected. For this research study, the regression and correlation techniques will be effective and useful to gather the responses of the participants who are the employees of procurement department in the construction SMEs in Ireland to find the influence of different techniques in e-procurement adoption on the SMEs of Ireland. It has been mentioned earlier in the research that the nature of this research quantitative for which the respondents' demographic information as well as the frequency distribution analysis of the respondents' answers will be present in the research through bar charts and tables. The tables, bar charts, and pie charts along with the regression and correlation analysis technique will also be made through SPSS, which will be interpreted to get the results and outcomes of the study. The descriptive as well as statistical data will be presented and interpreted. After that, a detailed discussion of the responses and findings of the research will be performed in linked with the literature review and previously concluded and published data so that the validity and reliability of the data can be tested. The critical evaluation is required in the discussion of findings' section (Cleveland & Devlin, 1988). Furthermore, the research will be summarized and concluded in the next section from data analysis, which is conclusion. The conclusion section will also have recommendations based on the findings and limitations of the research.

In order to increase the validity of research the collected data and information should be critically analysed. Therefore, the study's data will be critically evaluated statistical according to the data's qualitative nature. In the research, the technique use will be multiple regression

technique; linear regression technique is adopted when the effect of independent variable will be examined on the dependent variable.

3.8. Sampling and Population

In this section, research participants and their characteristics will be defined. The research study is focusing on e-procurement techniques' impact on SMES construction industry in Ireland. The target population is therefore will be the procurement managers and employees who work in a construction companies in Ireland will be selected as the research sample. The total number of participants selected for the research will be 50 from different SMEs in construction industry of Ireland. The participants of the research will be selected by searching from LinkedIn accounts and other social networking sites searching by keywords. The participants will participate in the research by Skype calls, emails, or telephonic conversation (Adam, 2008, p. 32). The experienced professionals will be selected to participate in the research who is working in the industry for more than 5 years due to their experience and detailed knowledge about the procurement process and other aspects of the construction industry (Gorman & Johnson, 2013). The age group of the research participants will be from 30-50. Both male and female research participants will be selected through convenience sampling strategy. It will also be important to identify if the employees working in procurement of construction industry have relevant qualification to participate in the research in order to have validated and reliable outcomes. The preferred respondents will be who have qualifications relevant to supply chain and operations management, etc. (Schonlau & Ronald, 2001, p. 421).

3.9. Ethical considerations

Ethical considerations are helpful for the researcher to maintain, in order to keep the important things in mind before and during conducting the research. The ethical considerations for this research study are mentioned as:

- The respondents of the research were informed about the nature of the research, importance, and purpose of the research and if anybody wants to withdraw from their participation, they would not be forced.
- The respondents were ensured that their personal information and identity would not be revealed in the research and would be kept confidential and anonymous

4.0. Results

This section of the report presents the results and findings of the research conducted by project managers of construction SMEs in Ireland.

4.1. Reliability and Validity

It is deemed essential to evaluate the validity of the research instrument before proceeding to data analysis. Cronbach's alpha test has been carried out in order to check the validity of the instrument and the results are shown in in the table 1. It can be seen that the result of Cronbach's alpha is 0.771, which depicts that the research instrument was valid.

Table 1 Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.771	10

The model summary presents the variance of the dependent and the dependent variable. The value of R shows that there is a variance of 73.8% while R square is 0.557 and adjusted R square is 0.427.

Table 2 Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.738a	.557	.427	.67770

- a. Predictors: (Constant), Better relationships with supplier, Improved communication, Improved risk management, Cost reduction, competitive advantage

Table 3 ANOVA

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.244	4	.311	.677	.001b
	Residual	20.667	45	.459		
	Total	21.911	49			

a. Dependent Variable: Improved construction project management

b. Predictors: (Constant), Better relationships with supplier, Improved communication, Improved risk management, Cost reduction. Competitive advantage

The table of ANOVA presents the overall significance of the research. As it can be seen that the value of significance is 0.001 and is less than P value of 0.05 therefore it can be stated that the overall model of research is significant.

4.2. Descriptive Results

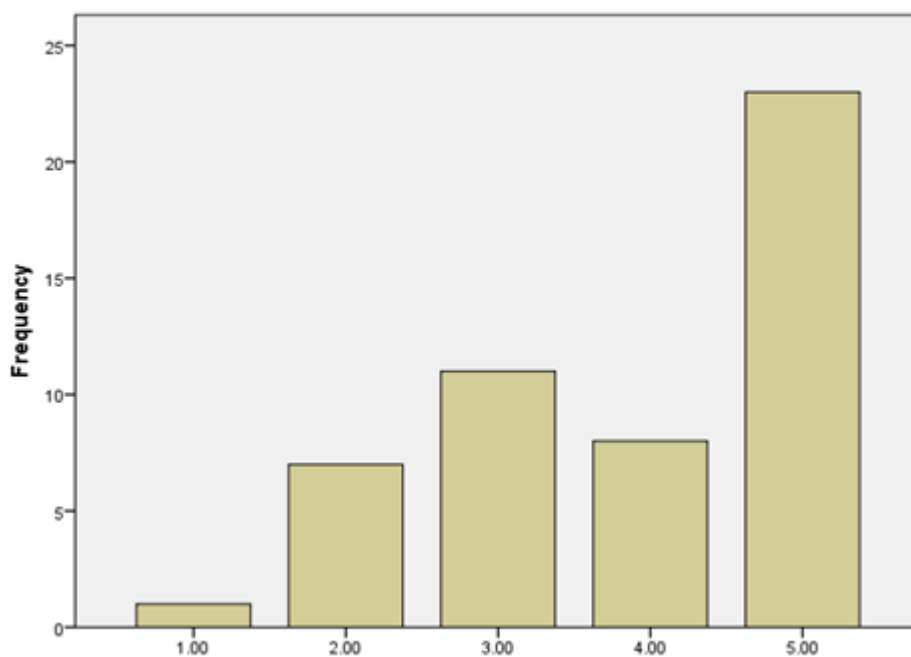


Figure 4: Better relationships

Table 4: Better relationships

	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	1	2.0	2.0	2.0
2.00	7	14.0	14.0	16.0
3.00	11	22.0	22.0	38.0
4.00	8	16.0	16.0	54.0
5.00	23	46.0	46.0	100.0
Total	50	100.0	100.0	

Table 2 and figure 2 represents the response regarding role of e-procurement on improving relationships of construction SMEs with suppliers. It has been found out that majority of respondents were of the opinion there is a role of e-procurement in improving relationships with suppliers as 46 percent of respondents strongly agreed with the statement. In addition, 16 percent of respondents agreed with the statement. Moreover, 22 percent of respondents were neutral on this statement and only 2 percent of respondents strongly disagreed with the statement...

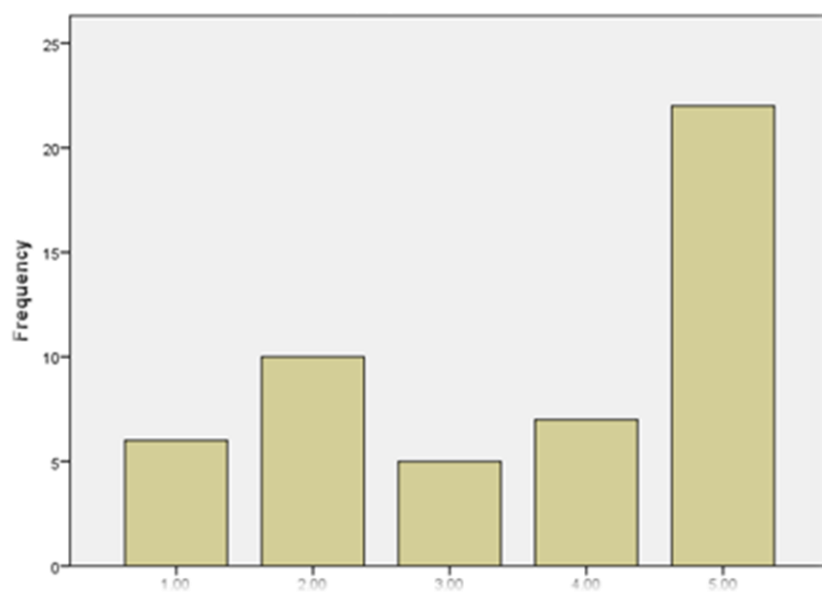


Figure 5: Risk management

Table 5: Risk management

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1.00	7	13.0	13.0	13.0
2.00	9	19.0	19.0	32.0
3.00	4	9.0	9.0	41.0
4.00	6	15.0	15.0	56.0
5.00	22	44.0	44.0	100.0
Total	50	100.0	100.0	

Table 3 and Figure 4 illustrate the response on the statement that e-procurement plays are effective for managing risks in construction projects. It has been found out that 44 percent of respondents strongly agreed with the statement. In addition, 15 percent of respondents agreed with the statement that e-procurements help in managing risks in construction projects. Whereas 9 percent of respondents preferred to stay neutral on this statement. On the other hand, 19 and 13 percent of the respondents disagreed and strongly disagreed with the statement respectively.

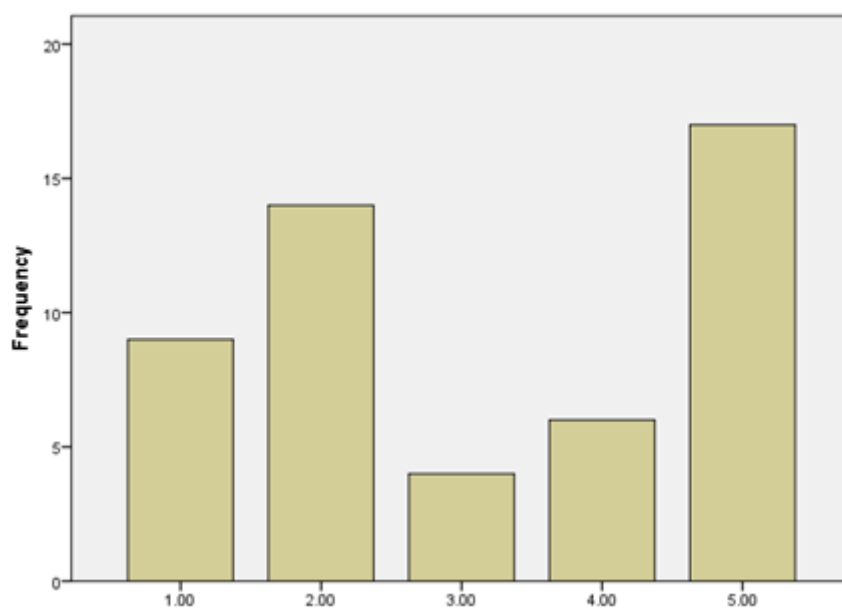


Figure 6: Improved Communication

Table 6: Improved Communication

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1.00	9	18.0	18.0	18.0
2.00	14	28.0	28.0	46.0
3.00	4	8.0	8.0	54.0
4.00	6	12.0	12.0	66.0
5.00	17	34.0	34.0	100.0
Total	50	100.0	100.0	

The above given table represents the response of respondents against the statement that e-procurement strategies help in improving the communication with stakeholders. It has been observed that majority of respondents that is 34 percent strongly agreed with the statement that e-procurement helps in improving the communication with stakeholders. Whereas 12 percent agreed with the statement, 8 percent stayed neutral, 28 percent disagreed, and 18 percent strongly disagreed with the statement.

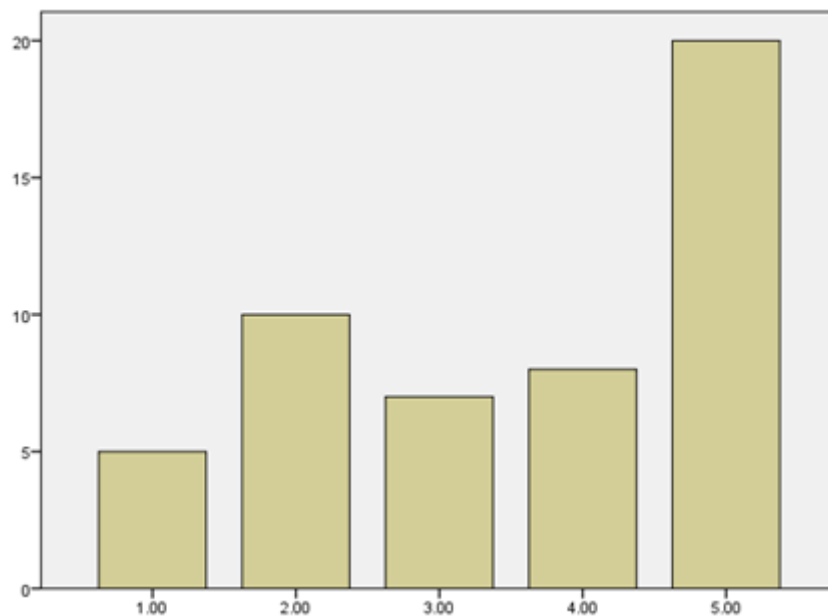


Figure 7: Cost Reduction

Table 7: Cost Reduction

	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	5	10.0	10.0	10.0
2.00	10	20.0	20.0	30.0
3.00	7	14.0	14.0	44.0
4.00	8	16.0	16.0	60.0
5.00	20	40.0	40.0	100.0
Total	50	100.0	100.0	

Table 5 and figure 6 depicts the response against the statement that E-procurement assist construction SMEs in reducing overall cost of the processes. The response showed that 40 percent of respondents strongly agreed with the statement, 16 percent of respondents agreed with this whereas 20 percent and 10 percent disagreed and strongly disagreed respectively.

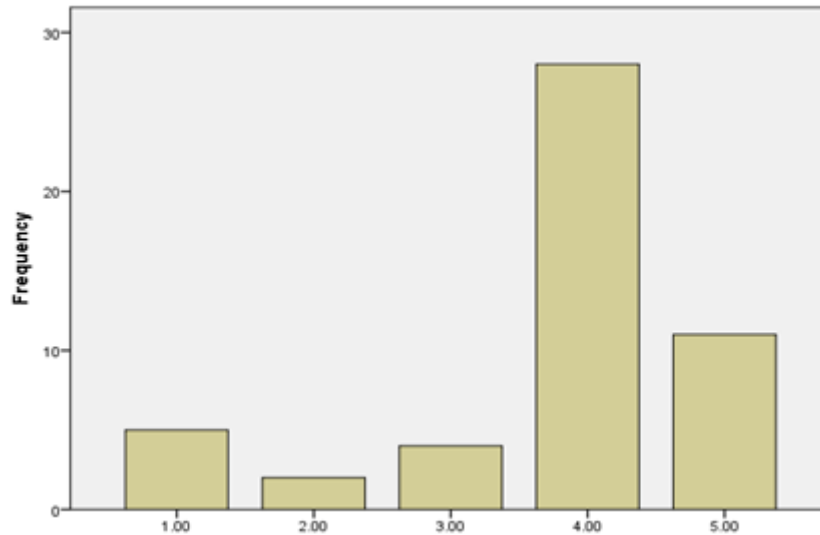


Figure 8: Competitive Advantage

Table 8: Competitive Advantage

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1.00	6	11.0	11.0	11.0
2.00	2	3.0	3.0	14.0
3.00	4	8.0	8.0	22.0
4.00	28	56.0	56.0	78.0
5.00	11	22.0	22.0	100.0
Total	50	100.0	100.0	

The above table and figure represents the results of survey pertaining to the statement that e-procurements help SMEs gaining competitive advantage in the construction industry. The results showed that 22 percent of participants strongly agreed that e-procurement helps in gaining competitive advantage whereas 56 percent of respondents agreed with it. On the other hand, 3 and 11 percent of participants disagreed and strongly agreed respectively.

5.0. Discussion

The results from primary data findings showed positive impact of different factors influencing the adoption of e-procurement in construction Industry of Ireland. The Literature review as well as primary data findings showed the impact of new technological implementation on the

supply chain processes within construction industry. Additionally, it was noticed from a research study that in order to gain competitive advantage in the industry, most of the businesses are transforming their sourcing and procurement practices through electronic procurement that allow them to achieve operational efficiency, better accountability, convenience, and cost reduction (Allison, 2018). The findings related to standard compliance can be related with a research study showing that the adoption of electronic procurement in construction industry of Ireland is affected by development of policies, change in policies, effective planning, and education of staff, management strategies, training, and risk management strategies (Angeles & Nath, 2007). Through prior planning such as demand forecasting through innovative technological applications that are implemented in the organizations such as Enterprise resource Planning Systems, material requirement planning systems, and manufacturing resource planning systems, the processes of demand planning and procurement planning have become easier and effective (Creamer & Backes, 2014). It was also noticed that technological applications such as ERP allow quicker and real time procurement planning and with this level of promptness, the business professionals plan to procure Just-in-time inventory for their businesses easily through electronic procurement modes. The use of Information technology in all aspects of construction business allows professionals to achieve operational efficiency, competitiveness, effectiveness, etc. (Mose, et al., 2013). Moreover, the better planning and risk factors both internal and external risks are reduced, time is saved, and overall business competencies are enhanced. The market competitiveness is gained by the business through better operations and business functions and therefore, it ultimately leads towards achieving competitive advantage (Creamer & Backes, 2014).

The literature related to e-procurement in construction industry also identified the aspects of human, financial, and physical resources, scope of market, target market, technological infrastructure of the organization and knowledge that affect business strategies (McCue & Roman, 2012). It was also found that business strategies are influenced by different type of innovative e-commerce models adopted by the organisations to achieve success (Chang, 2009). In addition, from the findings and literature review, it was observed that different organisational factors affect adoption of e-procurement in different industrial and business sectors such as allocation of budget, adoption of e-procurement, support of top management with the use of ICT and organisational policies related to ICT, and knowledge enhancement of e-procurement technologies (Angeles & Nath, 2007). Moreover, in a research study, different factors were identified that influence e-procurement decisions of management to implement in the

construction companies (Allison, 2018, pp. 39-47). The factors of e-procurement on the broader level are size of the organisation, support of top management for the adoption and implementation of a new technological infrastructure in the company, and perceived direct as well as indirect benefits of having e-procurement strategies by the organisation (Trkman & McCormack, 2009, pp. 338-349). From the primary data findings of this research, it was observed that the influence of business partners such as suppliers on e-procurement strategies is positive significantly, one of the reasons can be growing trend in adoption of e-procurement in the organisations. With the increase in globalisation trend, the opportunities of global sourcing have also been increased and through e-procurement adoption, the opportunities of global procurement from low-cost countries can be availed easily and different benefits can be achieved (Trkman & McCormack, 2009; Mose, et al., 2013).

It is observed in a research that factors affecting e-procurement in different sectors of construction industry such as contractors, professional consulting organisations, client organisations, and establishment of government may be different but overall internal and external factors affect same business strategies (McCue & Roman, 2012). The business strategy of e-procurement is adopted by the businesses because the benefits of electronic procurement strategies ensure efficient process of project delivery, enhance effective communication with suppliers as well as related stakeholders with procurement process, remove impediments of geography, and ease the overall business process due to lesser lead-time of procurement (Gardener, 2018). On the other hand, the research findings did not find the usefulness and effectiveness of different types of e-procurement systems and applications that are used in construction industry of Ireland (Shivaraman, et al., 2013). However, from previous research studies it is apparent that various factors of organisations affect the decisions to implement electronic procurement in different industrial and business sectors (Trkman & McCormack, 2009). The scope of the research is limited to the factors affecting e-procurement, which did not allow the researcher to comprehensively study different types of e-procurement systems but it can be said that demand-forecasting systems are necessary for effective and optimal procurement. Otherwise, the cost of inventory management and warehouse management will increase and the business will not be able to achieve cost related benefits (Shivaraman, et al., 2013).

The findings of this research study also did not study comprehensively about internal organisational factors that influence the decision to e-procurement adoption in construction industry and this leads to a research gap, which is not a part of the scope of this research. Rather

the factors were mainly related to communication, risk management, stakeholders' relationship, cost, and technological innovation that either affect or not on the construction industry in Ireland with respect to e-procurement adoption (Creamer & Backes, 2014). The reason why internal organisational factors not focused much is due to having diverse nature of organisational factors, which may vary from business to business. Within the construction industry, there are architectural businesses, contractors, and governmental building ministries, so the nature of businesses differ from one another having different impact of internal organisational factors (Trkman & McCormack, 2009; Allison, 2018). Additionally, it was identified that private sector organisations use e-procurement more than public sector or governmental counterparts. Therefore, it can be said that in Ireland, e-procurement adoption is prone more towards private sector businesses (Trkman & McCormack, 2009).

A research study of the construction industry of the UK and e-commerce adoption has been studied and the primary data findings are quite related to the findings of this study having similar technological infrastructure as well as similar socio-economic situation in both countries (Angeles & Nath, 2007). The similarities in the research studies are found however, the results contradicts to the extent that in the UK, the public sector organisations are leading with the adoption of e-procurement as well as global sourcing activities (Angeles & Nath, 2007). The role of governmental sector is leading and driving changes the developed countries such as the United Kingdom. The survey data findings from the study of UK revealed that the project managers in construction industry in UK were the leading adopters of construction e-procurement. The architects as well as engineers in the UK follow the procedures and strategies of technology oriented construction practices (Lock, 2007). Similarly, the legal environmental factors of Ireland are quite related to the UK and therefore, the business practices and technological adoption rate is high for the businesses for the growth and development of efficient business practices. The views on challenges and opportunities of e-procurement from literature review of this study showed the negative aspect of e-procurement functions on the business such as lack of trust, limited level of accountability from e-procurement practices, returns and refunds policies, legal constraints when global sourcing is done, etc. (McCue & Roman, 2012).

The government of Ireland also play an important role but from previous research studies, it was observed that governmental authorities are lacking towards the provision of technological infrastructure and also providing legal framework, regulatory framework, and leadership to deal with uptake of critical mass of electronic procurement (Allison, 2018). It can be persisted

for longer time if sufficient steps will not be taken to deal with the situation. It will take longer time in the developing nations but for Ireland, the governmental initiatives can be quite useful and implemented quickly due to lesser legal and political barriers. The level of automation will be increased through e-procurement and construction businesses will in line with the standardized global practices (Angeles & Nath, 2007). Moreover, related to different kinds of technologies of e-procurement such as applications, systems, and tools that are used to perform different tasks and processes of procurement, it was found that mostly, website and emails are used to communicate with the suppliers and negotiate on prices of the material (Shivaraman, et al., 2013). Interestingly, it was observed that when business professionals keep on communicating with the suppliers and stakeholders of the business, the information exchange becomes an effective way to maintain good and positive relationships with one another (Mose, et al., 2013). Business relationships management are important for the organisations to maintain their presence in the industry and communication is a good way to coordinate, collaborate, and work to achieve the goals and objectives of the organisation (Trkman & McCormack, 2009).

The availability, accessibility, etc. is also dealt through effective communication and ultimately the opportunities of tender or stakeholders coordinate projects. In Australia, the construction companies use special software for their supply chain functions such as ordering with email so that they can source and place procurement orders for the materials of construction and equipment (Shivaraman, et al., 2013). They also use different procurement related software having electronic payment transfer for products and services. There is low use of digital technology in different countries in Europe and Africa as for making payments and receiving payments, which should be changed and the countries in European region also have to adopt standardized online payment methods and techniques to fasten and improve the process (Trkman & McCormack, 2009). The electronic data interchange systems are used in different parts of USA and Australia for better exchange of information and enhanced communication. Also, in European countries, the low-utilisation of cloud systems have been observed including web 2.0 technologies, Dropbox, Microsoft SharePoint, and other interactive websites and applications that support the execution of different procurement tasks and activities (Chang, 2009).

The survey data findings of this study showed the responses of people about the benefits and challenges that e-procurement adoption can face and it was found that in order to optimise the supply chain functions, the use of technological applications and information systems is

effective. It provides edge to the organisations over competitors and business practices are standardized (Christensen, 2013). It was observed from literature review that the construction industry in Ireland need to develop more than it is now especially in the strategies of procurement by using integrative and interactive technologies of e-procurement, which promote coordination, integration of tasks of procurement, collaboration, etc. to enjoy the benefits of e-procurement fully (Christopher, 2016). Additionally, the infrastructure deficit is present in Ireland for newer technologies and trends of e-procurement and for that purpose, the awareness and investment is needed on the benefits of e-procurement technology.

The decision of adoption of new technology is influenced by the perception of the technology among business professional, cost, and expenditure of implementing the technology, perception of people about change in the organisation, internal and external risk factors, as well as probability of positive results and outcomes (Allison, 2018). The organisations cannot just adopt a business practice just because everyone else in the industry is doing that but the businesses need to study the current processes and procedures and try to adopt improvement mechanisms, new technology, and optimal techniques so that continuous improvement in the business practices is achieved (Lock, 2007). It is important to understand that through e-procurement adoption of technology, not only ordering process is optimised, but also, electronic notifications, electronic submission of information, electronic information transfer, electronic payment, and sourcing activities are performed (Shahram, 2014). Additionally, the negotiation process is also performed easily through price comparison mechanism of different suppliers for the material to be procured. The global sourcing allow the businesses to procure from international market as well on low priced suppliers and also the opportunities will be there to do business with reputable suppliers who provide high quality material and recognised globally (Trkman & McCormack, 2009).

Another aspect of e-procurement adoption found in the research to be innovation. Innovation is something every business strives for and innovative business practices stand the business out from other competitors (Christopher, 2016). The assertion is based on the idea that the factor of innovation drives the process of decision-making in the organisation on the other hand, the results found to be similar with the findings of this research that the factor of innovation is significant for the businesses. In addition, different types of businesses under construction industry such as contracting organisations, engineering organisations, and construction organisations strive to achieve innovation and gain competitive advantage in the market (Chang, 2009). To achieve innovation in business functions, the analysis of current business

practices and flaws in the processes should be identified so that top management support is gained for the implementation of new technology or better solutions for the gaps and flaws in the business functions (McCue & Roman, 2012). The support of top management is essential because they are the ones who will be investing to adopt new technological infrastructure and integrated systems in the organisation. The support of top management is desirable for every business in construction industry because they align e-procurement strategy with global trends that showed its positive relationship and significant influence on the decisions to adopt the strategies of e-procurement (Mose, et al., 2013). The factor of innovation and top management support both can be linked with policies of the organisation so that they can utilise and avail the opportunities of global trends and make the business more effective and efficient (Christopher, 2016).

In SMEs of construction industry in Ireland, the availability of Informational technological perceptive staff and emergence of financial base are the two essential factors that affect the adoption of e-procurement because in the review of a research study, the financial and human resources have been identified as key factors of e-procurement adoption in the company (Shivaraman, et al., 2013). On the other hand, the size of the company depends on the adoption of their strategies related to their supply chain processes and when it comes to small and medium sized organisations, the adoption of high cost technological infrastructure is problematic and quite risky for the business to gain positive outcome and quicker return on investment. It was found however, that organisational size also contributes to the decision of adopting e-procurement in the organisation (Allison, 2018).

On the organisational internal factors, the findings are significant as well because it shows key factors that need to be considered by the entities of construction, which might influence the decision of adopting electronic procurement are organisational attitude and perception about new technology and global trend (McCue & Roman, 2012, pp. 221-248). Moreover, for organisations, the financial and human resource availability is also needed with right level of expertise, skills, and knowledge so that they can use the applications of e-procurement. The convenience and ease are the primary factors that influence the decision of management with respect to e-procurement however; they need to focus on the bigger benefits such as reduction of cost of inventory maintenance and overheads of warehouse management because the demand planning and procurement is optimised through e-procurement facility in the organisation (Shivaraman, et al., 2013). Further, the survey found interesting and mostly positive aspects of communication, relationship management, reduction of cost, convenience,

and innovation, which allows the business professionals to understand the effectiveness and usefulness of e-procurement activities (Creamer & Backes, 2014). The findings and discussion based on that shows positive impact of e-procurement adoption in construction companies in Ireland irrespective of legal and political constraints, which can be dealt by the business (Trkman & McCormack, 2009). The decision and impact of adoption of e-procurement is useful for the business because the use of information technology on businesses bring innovation if correctly utilised and reporting allows management to take business decisions for the material to be procured and other supplier related aspects (Trkman & McCormack, 2009; Allison, 2018). The use of different applications as well as techniques such as websites and emails for communication and procurement support the execution of procurement activities, tasks make the business more efficient and effective, and supplier satisfaction with high level of communication is achieved (Christensen, 2013). The competitive advantage with innovation bring business to another level of competitiveness in the industry and with global sourcing strategy as a part of e-procurement adoption in the organisation helps the company to make business with reputable and globally recognised suppliers and business partners, which increases their brand value and overall reputation of the organisation is increased (Chang, 2009).

6.0. Conclusion

This research was about analysing the impact of strategic e-procurement policies on project performance in the construction industry in Ireland. Furthermore, this research highlighted the benefits e-procurement provides in construction project management in Ireland. This research aimed to investigate the current practices of construction SME's in Ireland related to E-procurement, To explore the benefits of e-procurement for construction project management, and to determine the impact of E-procurement on project performance. This research used the interpretivism research philosophy or research paradigm. Furthermore, in conducting this research, the deductive approach was used. The deductive approach helped in analysing the research aims, facilitated in testing the hypothesis which was "E-procurement can have a positive impact on project performance in the construction industry of Ireland." In conducting this research, mono method "quantitative study" was preferred to meet the aims of this research. Additionally, for gathering literature previous researches, published material such as journal articles, books, reports, websites, etc. were focused. This research study was

quantitative in nature, so a questionnaire survey strategy as their primary data collection approach was used. The time horizon was cross-sectional, and for the research instrument, the Likert Scale strategy was used to gather the responses of the participants in an orderly form. Additionally, the age group of the research participants was from 30-50. Both male and female research participants were selected through a convenience sampling strategy. Furthermore, this research survey aimed to identify many aspects of implementing procurement in construction companies in which attributes of technology, internal and external factors, industrial factors, and e-procurement adoption were focused. In gathering the relevant literature review, e-procurement practices in the construction industry, benefits and challenges of e-procurement for constructing industry, e-procurement and shareholder communication, and the role of information technology in construction. Additionally, the critical rescue of value information technology and e-procurement practices, knowledge management and e-procurement in the construction industry drivers of e-procurement in construction organization and analysis of drivers and barriers relation to e-procurement in Ireland was studied. The theoretical background of this research was based on five theories, which were diffusion of innovation, theory of reasoned action, technology acceptance model, technological organizational and environmental model, and technology acceptance model.

This research concluded that the application of e-procurement could be beneficial for the construction industries in Ireland. However, the business must focus on the drivers and barriers of e-procurement applications. The literature review concluded that every company is different from each other, although it lies in the same industry. Correspondingly, it is not suitable for the project manager or business to implement the same strategies as every other company is executing. It is focused that for application of e-procurement, organizational culture, competency skills, and acceptance from the employees are required. Additionally, it is observed that a system that reduces the cost of operations and enhances the productivity of the business can create a positive image of the company in the marketplace. Furthermore, the literature concluded that to augment the use of e-procurement, benchmarking/mapping the barriers and drivers is required. This research concluded that the application of e-procurement bridge the gap between suppliers and manufacturers. It is observed that communication is the first and foremost driver of productivity after the adaptation of e-procurement. Based on the primary research which is conducted by the survey, it is observed that most of the businesses are transforming their sourcing and procurement practices through electronic procurement that allows them to achieve operational efficiency, better accountability, convenience, and cost

reduction. Furthermore, this research concluded that the adoption of electronic procurement in the construction industry of Ireland is affected by the development of policies, changes in policies, effective planning, and education of staff, management strategies, training, and risk management strategies. In conducting this research, it is analysed that external factor such as technology impacts the productivity of the business. The adaptation of advanced technology in the operation can create a competitive advantage of the business in the market place.

References

- Abawi, K., 2013. *Data Collection Instruments*, s.l.: Training in Sexual and Reproductive Health Research Geneva.
- Abeyasekera, S., 2003. Quantitative Analysis Approaches to Qualitative data: Why, When & How. *Journal of Participatory Research Methods, Implementation, Effectiveness, and Institutional Context*.
- Ackroyd & Hughes, J., 2010. *Data Collection for predictive analysis*. 4 ed. UK: Longman.
- Adam, A., 2008. Questionnaires, in-depth interviews and focus groups. *Research Methods for Human Computer Interaction*, 23(2), pp. 17-34.
- Adrienne, C., 2011. *The Oxford Handbook of Workplace Discrimination*. London: Sage.
- Allison, A., 2018. The use of e-procurement in South African public procurement law: challenges and prospects, pg. 39-47.. *Law, Democracy & Development*, 22, pp.The-use..
- Angeles, R. & Nath, R., 2007. Business-to-business e-procurement: success factors and challenges to implementation.. *Supply Chain Management: An International Journal*, 12(2), pp.104-115..
- Bartunek, J. & Seo, M., 2002. Qualitative research can add new meanings to quantitative research.. *Journal of Organizational Behavior*,, pp. 237-242.
- Bernard, H., 2009. Qualitative data, quantitative analysis. *CAM Journal*, pp. 9-11.
- Björk, B., 2003. Electronic document management in construction-research issues and results. *Electronic Journal of Information Technology in Construction*.
- Bredillet, C., Yati, F. & Ruiz, P., 2010. Project management deployment: The role of cultural factors. *International Journal of Project Management*, Volume 28, p. 183–193.
- Brewster, C., Sparrow, P. & Veron, G., 2011. *International Human Resource Management*. London : CIPD.
- Burke, R., 2003. *Project Management: Planning And Control Techniques*. US: John Wiley & Sons .
- Carrie, W., 2007. Research Methods. *Journal of Business & Economic Research*, 5(3), pp. 65-73.
- Chang, G., 2009. Total Quality management in supply chain. *International Business Research*, 2(2), pp. 82-85.
- Christensen, M., 2013. *How does the organizations strengthen its supply chain and added value*. [Online] [Accessed 2019].
- Christopher, M., 2016. *Logistics & supply chain management*.. s.l.:Pearson UK..
- Cleveland, W. & Devlin, S., 1988. Locally weighted regression: an approach to regression analysis by local fitting.. *Journal of the American statistical association*, , pp. 596-610.

- Cremer, D. & Backes, M., 2014. *Logistics and Supply Chain management challenges*. [Online]
Available at: <http://www.total-logistics.com/logistics-clients/logistics-clients-portfolio>
[Accessed 2019].
- Daim, T. U., Ha, A. & Reutiman, S., 2012. Exploring the communication breakdown in global virtual teams. *International Journal of Project Management* , Volume 30, p. 199–212.
- Daim, T. U., Ha, A. & Reutiman, S., 2019. Exploring the communication breakdown in global virtual teams. *International Journal of Project Management*, Volume 30, p. 199–212.
- Eadie, R., Perera, S., Heaney, G. & Carlisl, J., 2007. DRIVERS AND BARRIERS TO PUBLIC SECTOR E-PROCUREMENT WITHIN NORTHERN IRELAND'S CONSTRUCTION INDUSTRY. *Electronic Journal of Information Technology in Construction* .
- Gardener, P., 2005. *Project Management: A Strategic Planning Approach*. London: Sage .
- Gardener, P., 2018. *Project Management: A Strategic Planning Approach*. London: Sage.
- Gillen, D., 2016. Aviation economics and forecasting.. *Air Transport Management: An International Perspective*; Budd, L., Ison, S., Eds, pp.23-40..
- Gorman, K. & Johnson, E. D., 2013. *Quantitative analysis*. s.l.:Oxford University Press.
- Gray, C. & Larson, E., 2005. *Project Management: The Managerial Process*. US: McGraw-Hill Professional.
- Hoong, n. L. S. & Lin, L. S. T. a. M.-H., 2017. *Affective Technology Acceptance Model: Extending Technology Acceptance Model with Positive and Negative Affect*. [Online]
Available at: <https://www.intechopen.com/books/knowledge-management-strategies-and-applications/affective-technology-acceptance-model-extending-technology-acceptance-model-with-positive-and-negati>
- Ika, L. A., 2009. Project Success as a Topic in Project Management Journals.. *Project Management Journal*, 40(4), pp. 6-19.
- Iles, P. & Zhang, C., 2013. *International Human Resource Management*. London : CIPD.
- Johnson, N., 2009. Writing a Quantitative Research Thesis. *International Journal of Education and Science*, 1(1), pp. 19-32.
- Kassim, U. & Raphael, B., 2009. *Data Envelopment Analysis of IT-enabled strategy for Construction Organisations*, s.l.: Annual ARCOM Conference.
- Kerzner, H., 2006. *Project Management Best Practices: Achieving Global Excellence*. London: Willey .
- Kohli, R. D., 2003. *Measuring Information Technology Payoff: A Meta-Analysis of Structural Variables in Firm-Level Empirical Research*. , s.l.: Information Systems Research,.
- Koster, K., 2016. *International Project Management*. 1 ed. London: Sage.

- Larson, E. & David, G., 2017. Significance of Project Management Structure on Development Success. *IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT*, 36(2), pp. 133-144.
- Lippert, S. a. G. C., 2006. *Technological, organizational, and environmental antecedents to web services adoption*, s.l.: Communications of the IIMA.
- Lock, D., 2007. *Project Management, 9th Edition, Uk: Gower Publications Office Of Government Commerce (2005), Managing Successful Projects With Prince*. London: The Stationery Office.
- Madden, Ellen & Ajzen, I., 1992. *A comparison of the theory of planned behavior and the theory of reasoned action*, s.l.: Personality and social psychology Bulletin.
- McCue, C. & Roman, A., 2012. E-procurement: Myth or reality.. *Journal of Public Procurement*, 12(2), pp.221-248..
- Meliha, H. & Nermina, D., 2017. *Knowledge Management, Intellectual Capital and Project Management*., India: s.n.
- Mose, J., Njihia, J. & Magutu, P., 2013. The critical success factors and challenges in e-procurement adoption among large scale manufacturing firms in Nairobi, Kenya.. *European Scientific Journal*, 9(13)..
- Olivier, S., 2012. *Managing Knowledge in Project Environments*, London : ADB .
- Pierre, H., 2010. Robert, Determinants of construction companies' use of web-based interorganizational information systems Supply Chain Management. *An International Journal*.
- QCHEM, 2017. *Overview*. [Online]
Available at: <https://www.qchem.com.qa/internet/Pages/overview.aspx>
[Accessed 2019].
- Resnik, D. B., 2015. What is Ethics in businesses & Why is it Important?. *National institute of business ethics*.
- Richer, R., 2014. Sustainable development in Qatar: Challenges and opportunities. *Qscience*.
- Robertson, T., 1967. The process of innovation and the diffusion of innovation. *Journal of marketing*.
- Saunders, 2009. *Research Methodology* , London : Sage.
- Schonlau, M. & Ronald, D. F., 2001. *Conducting Research Surveys via E-mail and the Web*. [Online]
Available at: <http://www.rand.org/publications/MR/MR1480/>
[Accessed 05 11 2019].
- Shahram, S., 2014. Importance of Knowledge Management Processes in a Project-based organization: A Case Study of Research Enterprise. *Preocedia Engineering* , Volume 97, pp. 1825-1830.

Shivaraman, S., Kumar, V. & Madhavan, K., 2013. *Building World-class Supply chains*, s.l.: A.T. Kearney Inc..

Sparrow, E., 2013. *Successful IT Outsourcing: From Choosing a Provider to Managing the Project*. 1 ed. London : Springer.

Trkman, P. & McCormack, K., 2009. Estimating the benefits and risks of implementing e-procurement. *IEEE Transactions on Engineering Management*, 57(2), pp.338-349..

Yeates. & Cadle, 2004. *Project Management For Information Systems*., London: Prentice Hall.

Appendix 1

Questionnaire

1. Name:

2. Designation :

3. Age:

4. Experience in Construction Industry

5. E-procurement improves general conditions with suppliers

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

1. E-procurement is beneficial in acquisition of data in system

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

2. E-procurement leads to improved communication with suppliers

- Strongly Agree
- Agree

- Neutral
- Disagree
- Strongly Disagree

3. There is a positive correlation between E-procurement and shorter purchasing process

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

4. E-procurement helps in lowering administrative cost

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

5. Improved price transparency can be achieved with the help of E-procurement

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

6. E-procurement is expense for SMEs in Ireland

- Strongly Agree
- Agree
- Neutral
- Disagree

- Strongly Disagree

7. Lack of expertise creates problems in implementation of E-procurement

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

8. Structure of companies do not allow implementation of E-procurement

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9. E-procurement helps in improving efficiency in stakeholders coordination

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree