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An investigation into the challenges in the road construction project in Qatar

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ABSTRACT

The study below conducts an investigation into the road construction project in Doha, Qatar, to understand the challenges faced by the project management team in different stages of the road construction project. The study presents a background of the study, leading to the critical discussion of the extant literature review. The study identifies the themes to conduct the primary research collection from the extant literature review that helps with the questionnaire. The primary data is collected from five project managers who worked in different stages of the road construction project, leading to the analysis and conclusion, finally helping with the recommendations.

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CHAPTER ONE: INTRODUCTION

1.0 INTRODUCTION

In the current era of globalisation, road construction projects have the potential to provide a high degree of profitability to as a project, however, it comes with its own set of inherent risk (Löwstedt et al., 2018; Khoshgoftar et al., 2010; Hossen et al., 2015). The process is full of challenges in the process of construction such as loose surface soil particles (Zhen-Yu and Lin-Ling, 2008; Flood and Issa, 2010; Gustavsson and Gohary, 2012). Soil erosion from the slopes dust emission and water (Taillandier et al., 2015; Flood and Issa, 2010; Zavadskas et al., 2010). This potentially could cause hindrances and delay in the completion of projects. Moreover, there are challenges that emerge from environmental reasons (Pietroforte and Stefani, 2004; Söderholm, 2008). Similarly, there are challenges that arise from the technical aspects of project management. However, with project management, technology has played an imperative role to transform the industry (Zou et al., 2007' Manelele and Muya, 2008). At the same time this makes it imperative for the road construction projects to keep in pace with the technology else they would lose the competitive advantage and the technologies continue to evolve rapidly (Zhen-Yu and Lin-Ling, 2008; Khoshgoftar et al., 2010; Manelele and Muya, 2008).

Furthermore, road construction projects often face a broad range of difficulties, such as delays, overruns, lack of availability of management and technical professional and project developers (Sachs et al., 2007). This makes it even more challenging for the project management team to oversee and hold a full control over the successful completion and execution of road construction projects (Zhen-Yu and Lin-Ling, 2008). Further, the road construction challenges tend to be continuous in nature, making the process to be added with new challenges occurring because of many of the factors such as the environment and technology (Yildiz et al., 2014). Thus, it is imperative to understand these issues to work towards the resolution of the same to address the challenges within the industry.

Furthermore, there are challenges experience by road construction projects, when the projects embed the existing roads and the role of new infrastructure is continually faced with challenges from the current traffic (Khoshgoftar et al., 2010; Yildiz et al., 2014). This makes it imperative for the road construction project management team to take into account the requirements of modernization of quality roads in the country. This also leads to challenges where road construction projects faced comprehensive issues that exceed the initial scheduled time and costs estimate because of the expansion of the scope of the project, amendments in the procurement systems, thus having a significant impact on the decision

of the success or failure of the road construction projects (Löwstedt et al., 2018; Khoshgoftar et al., 2010).

This explains the need of a deeper knowledge and understand of the broad range of significant factors that often hinder the successful and timely completion of the road construction projects (Taillandier et al., 2015; Yildiz et al., 2014). The process consists of looking into the reasons of delays and cost overruns, or rather the lack of support from the stakeholders, investors and challenges from the government and non-governmental authorities. This can aid the project management team to minimize the negative impacts of these challenges and hinderances that potentially come with further repercussions of claims and legal disputes, further adding to the costs arising from the legal trial or rather complete abandonment of the project (Khoshgoftar et al., 2010; Yildiz et al., 2014).

1.1 RESEARCH AIM AND OBJECTIVES

To conduct an investigation into the issues facing quality in road construction projects in Qatar, the study defines the research aim and objectives.

To achieve the research aim the study works with the following objectives:

1. To investigate the factors that have resulted in key issues in road construction projects in Qatar for the Orbital highway for the period of 2014-2019.
2. To investigate how does the projects management overcome these issues.
3. To recommend strategies that can help the project management to avoid or overcome these issues in the future. Constructions project

1.2 THE ORBITAL HIGHWAY AND TRUCK ROUTE PROJECT, DOHA QATAR

The Orbital Highway and Truck Route, Doha is a road construction project that runs 185 kilometres long and will connect Mesaieed towards the south to the West of Al Khor in Qatar, with the bypass to the capital city of Doha. The development of the highway project is the key part of the nation's Expressway Programme that aims to construct a broad highway network with an endeavour to transform the way the citizens' travel by road in Qatar (QDVC, 2020).

The road construction project is developed by Ashghal, Qatar' public works authority. The project was developed in four phases consisting of the construction of the twenty-one interchange, flyovers and tunnels. The construction for the project started in 2014 with the completion and inauguration of the first phase in July 2017. The entire project was completed in 2018 (QDVC, 2020).

1.2.1 DETAILS OF THE NEW ORBITAL HIGHWAY AND TRUCK PROJECT DETAILS AND ITS KEY ADVANTAGES

The programme predominantly consisted the construction and development of the integrated infrastructure and the robust network that has been equipped with the vast range of advanced technologies consisting of the electrical services, stormwater networks, and the intelligent transportation systems (QDVC, 2020). The programme has successfully delivered over 800 kilometres of efficient, robust and safe roads with the implementation of over thirty project that have been classified broadly into forty-six contracts (QDVC, 2020).

Furthermore, the project is expected to ease off the high levels of traffic congestion currently faced by the capital city Doha, and rather create an alternative route between Mesaieed and Al Khor that enables faster journeys for the citizens. Moreover, the project has played an imperative role to connect the broad range of highways and the main routes in Doha consisting of the G-Ring Road, Dukhan High, Salwa Road and Al Shamal Road. Furthermore, the project has assisted the citizens of Doha with the direct link to the broad network of stadiums that will host the epic FIFA 2022 World Cup to be held in Doha, such as Al Rayyan, Lusai, Al Khor and similar sports facilities (QDVC, 2020).

1.2.2 DIFFERENT PHASES OF THE DEVELOPMENT OF THE PROJECT

The project was developed in four contractual phases, wherein the first phase consisted of the construction of 45 kilometre of the road construction project towards the south west Doha. This further encompasses the construction of the new Dual carriage way that connect Al Wakra bypass to the New Doha Port with the other phases of the highway and the road that links Mesaieed road towards the east and west corridor (QDVC, 2020).

Moreover, the first phased played an imperative role by providing a direct link between the Al Khor and the Hamad Port that passes through the G-Ring Road, Salwa Road, Al Shamal Road, Industrial Area, Dukhan Highway and Lusail City. Further, the second phase comprised of 48 Kilometres of the new dual carriageway in both the northern and western part of the capital city of Doha. It starts from the Salwa Road and ends towards the North Relief Road with the segment consisting of eight grade separated interchange that is further made up of give lanes that comprise of the two separated truck lanes in every direction (QDVC, 2020).

Further, the third phase consisted of the fifty-five kilometres of the dual carriageway build between Salwa road and Mesaieed consisting of five two-level interchanges along with the five lanes and two truck lane in every direction and scope to build two lanes in the future. lastly, the fourth phase is build in the north and west of the Doha city that encompasses 42 kilometres of new dual carriageways, along with the five grade of separated interchanges.

This route initiates from the Dukhan Highway and terminates at the Al Khor Link Road (QDVC, 2020).

1.2.3 DETAILS OF CONSTRUCTION

The initial construction started in the first quarter of 2014 and completed in July 2017. During this phase the project successfully addressed the 125 kilometres long road that initiated from Hamad Port to Al Shamal Road, which further stretched to Lusail and Al Khor. Within this construction phase, a segment of the Dukhan Highway towards North Road and Al Khor Link Road initiated in the second quarter of 2014(QDVC, 2020). Further, in March 2017, the construction phase of the project started on the inter-change on Al Shamal Road comprising of five lanes in every direction and that was open for the citizens to use in 2018. It played an imperative to enhance the road networking that connects to Al Shamal, Lusail, Al Ruwais, and Salwa Road (QDVC, 2020).

1.2.4 CONTRACTORS INVOVLED WITH THE NEW HIGHWAY PROJECT IN DOHA. QATAR

The project was awarded to J&P for the contract of $896m to design and construct the first phase of the highway project. The company then sub-contracted some part of the work to WSO to design the section that consisted of 45 kilometres along with the four grade separated interchanges (QDVC, 2020).

Further, the joint venture consisted of the Leighton Contracting Qatar with the al Kaber Engineering that was awared with the $1.7 billion-dollar contract to design and conduct the development of the design and the road segment construction that initiate from Mesaieed towards Salwa Road. The joint venture further engaged ACES Doha Geophysical unit to carry on with the geophysical survey to ensure the accuracy in the completion of the section. Further, the design and construction of the segment contract that consisted of $ 1.16bn that started from Salwa Road towards North Relief road section was given to QDVC and Bin Omran to work as a joint venture (QDVC, 2020). Further, AECOM Middle East was Awarded a 148 million dollar contract to ensure the supply of supervision and design reviews services for the project that commenced in midway of 2013. Furthermore, Arcadis took the responsibility to design the freeway management system with the contract that was awarded for 47 kilometres for the Outer Orbital (QDVC, 2020). Further, Salfo and Associated designed the temporary management plans that formed a key element of the third contract, moreover Dar Group won the bid for the fourth phase of the contract. Lastly, KBR conducted the supervision of the design consultants and also worked as the construction contractors

for the project after they were appointed as the programme management consults for the entire project (QDVC, 2020).

CHAPTER TWO: LITERATURE REVIEW

2.0 INTRODUCTION

The chapter presents a critical discussion on the challenges faced by the project management team in the process of the road completion project.

2.1 STAKEHOLDER CHALLENGES

Stakeholder management is one of the key elements required to ensure the success of most of the road construction projects (Schmeer, 1999). More so where multiple key projects are placed for design and construction to take place at the same time. In a situation like this, a broad range of individuals tend to be involved from diverse backgrounds across in different stages of project management, both internal and external (PMI, 2013). When a multi-disciplinary project is not capable of understanding the broad range of interfaces involving in different stages of a project it results in costly delays because of inability to collaborate with multiple stakeholders (PMI. 2017).

Moreover, with the road construction projects, stakeholders demand reliable, accurate and timely information to understand the streamlining of the construction and design of the projects (PMI. 2017). There is a requirement for the understanding of the latest requirements, interests and current assets of all the stakeholders involved. This helps the project management team to lead and guide the road construction project to be delivered in a timely and safe manner to be delivered within a cost-effective approach (PMI. 2017).

It is imperative for the project management team to bear in mind the influence and the power of the individuals and groups of individuals to impact the project in different stages (Bourne and Walker, 2005). Stakeholders can create a significant impact, both positive and negative on the entire projects of the project management (PMI, 2013). This makes it imperative to identify the stakeholders and their influence in different stages of the project to engage with the different stakeholders as early as possible (Mendelow, 1981). There needs for a proper planning and communication approach to manage the broad range of stakeholders and the specific procedures to be implemented for every stakeholder to be identified (Bourne and Walker, 2005). It is imperative to work towards the stakeholder engagement and communication to understand the key stakeholders and their decision-making power to engage and communicate for the different requirement of the approvals (PMI. 2017). It is further imperative to understand the stakeholder requirements and different procedures that are required to be followed in different stages of project management team to obtain the inputs and approaches for different purposes (Bourne and Walker, 2005). It is imperative to continually report and follow up with the different stakeholder at a well-define time interval. There is are broad

range of issues that need to be resolved that consist of multiple interfaces and interactions with both the internal and external stakeholders (Schmeer, 1999). There are many issues that need to resolve to enhance the stakeholder engagement and the broad range of communication processes. There are always requirements for internal approval and issues and conflicts that take place between departments with variant perspectives (PMI, 2013).

Furthermore, there are conflicts that take place in the different stages of project management between departments and their sections between the internal and external stakeholders that result in a multitude of miscommunication and misinterpretations (PMI. 2017). Moreover, there are continuous evolutions in the requirements and standards with missing or unclear guidelines that do not get officially communicated to all the stakeholders involved in a timely manner (Mitchel et al., 1997).

One of the most popular challenges that come in the way in different stages of project management is always the lack of interest or the desire not to be involved that leads to the delays in the approval as the same is not a priority for many stakeholders (Bourne and Walker, 2005). This approach further impacts the working relationship with the external stakeholders and causes further delays to finalize their own work based on the priority of the requirement (PMI, 2013). This makes it imperative for the project management team to identify the stakeholder as early as possible and also identify their influence and interest to the project (Bourne and Walker, 2005). Furthermore, to avoid issues with the stakeholders, it is imperative to understand the current requirements of the stakeholders and the required approvals as early possible (Schmeer, 1999). This can aid the project management teams with the appropriate stakeholder communication plans and setup for the same. Furthermore, it is advisable to limit the number of key stakeholders to eliminate the role of unnecessary communication that can give rise to the complexities along with the miscommunication and delays in the process of achieving approvals (Mitchel et al., 1997). Furthermore, with the use of latest technology it has become possible significantly improve the stakeholder engagement and communication (PMI. 2017). Undoubtedly, successful stakeholder engagement and management will produce positive results with safety, cost and time towards effective and efficient timely project deliverables (PMI, 2013).

Furthermore, there are issues faced by road construction project with hydrology, drainage issues, soil mechanisms that demands an in-depth knowledge of the soil properties that can play an imperative role in amending the different stages of hydrologic cycle and road construction (Bourne and Walker, 2005). Moreover, there are challenge such as rock slide, floods, sink holes, earthquakes, ground movements and mud waves as a consequence of poor testing, construction and poor road planning and engineering (Mitchel et al., 1997). This demands the project management team to be prepared with adequate ground drainage systems with robust road beds and relative dryness to ensure no hindrance to the future traffic (Schmeer, 1999).

Moreover, road construction projects come with a many area of comprehensive projects, consisting of excavation, grading, earth moving, bridges, culverts, concrete, traffic signals and asphalt asphalts

applications along with a broad range of environmental approaches that involved a broad range of skill sets to be implemented (PMI, 2013). The requirement for the equipment is intensive and more often than not subjective to the availability and will of nature that demands the needs for the expensive standby of the required equipment. Moreover, the equipment's used are intensive as well and depend significantly on the new technology and are predominantly that further require to interact with the employees based on.an intensive digital experience (PMI. 2017). Thus, the road projects do come with high rate of profitability, at the same time they come with a high range of risks in the process. Some of the technologies required consist of the cloud-based software, mobile project management and integrated collaboration (Bourne and Walker, 2005). Moreover, this makes it imperative for the road construction project management team to comprehensively understand the process of implementation before they proceed to implement the same. Undoubtedly, when the technology is not implemented properly it will result in the technical issues that will result in hinderances and challenges in the construction process (PMI, 2013). It is unlikely that any construction project management team will entirely know the different aspects of the road construction process. Moreover, some of the key challenges consist of poor quality that leads to delays in completion of road construction projects (Schmeer, 1999)

2.2 COST ESCALATION AND POOR QUALITY

One of the key challenges faced consist of continual time escalation and also the poor quality (Zou et al., 2007). These two factors have become a common place some of the challenges that repeat in different stages of the road construction project (Al Zubaidi and Al Otaibi, 2008). The key reasons for the same consist of the endemic and prevalent corruption along with the weak governance to control the same (Zou and Zhang, 2009) . Moreover, some of the key causes of an alarming rate of corruption that take place in the road construction projects over a period of times consist of the fact that the construction industry has a vast network of ties with the government (Zhen-Yu and Lin-Ling, 2008). Moreover, the road construction industry is based on the complex, and non-standards processes and paradigms that have the ability to foster and disseminating asymmetric information stocks between the project management team and the clients (Löwstedt et al., 2018).

Furthermore, the construction industry is comprised of the broad range of actors that work together in based on coordination of the complex and contractual structure with the drivers of the broad range of psychological human behaviour that further plays an imperative role to contribute to the corrupt activities in the different stage of road construction management (Zeng et al., 2007). Moreover, all over the world, more often than not, the construction industry tends to rank as one of the topmost corrupt industries because of the large financial

gains in the process (Zou and Zhang, 2009). This is further supported by the continual revision of contracts and disobedience of regulations that take place from the start of the project till the end (Baiden et al., 2006). Furthermore, what makes the situation even more complex is that that impact of bribery and corruption further extends to the quality of construction as evident in many of the poor quality of infrastructures with lower levels of economic returns, along with lower level of funding allocated to ensure timely maintenance because the level of the impact of corruption (Lundin et al., 2015). Furthermore, the factors that give birth to the different levels of corruption also extend to creation the shortage in the required skills within the construction industry to complete the road project (Vit, 2011). Further the same corruption also has the ability to create a perceived absence of deterrents and sanction further based on poor level of ethical standards (Löwstedt et al., 2018).

2.3 CHALLENGES WITH STAKEHOLDERS IN ROAD CONSTRUCTION PROJECTS.

Stakeholders play an imperative role with a broad variety of projects. Most of the projects are characterized by a broad range of stakeholders who tend to be actively involved with the different stages of project management (Zayed et al., 2008). Different set of stakeholders have different stakes in the different phases of project management from the start of the project till the completion (Zavadskas et al., 2010). With a road construction project, the stakeholder can be a client, investor, government, consultant, suppliers, contractor, environmental groups, services providers, and local community leaders (Xenidis and Angelides, 2005). Stakeholders can be further analysed as internal stakeholders and external stakeholders, or also can be understood as primary stakeholders and secondary stakeholders (Zou and Zhang, 2009). Stakeholder management is one of the vital components of road construction management (Yildiz et al., 2014). This can be further elaborated as the continual disagreements that take place in different stages of project management in terms of design, timelines, and budget (Wright, 2005; Chan et al., 2004). Furthermore, some of the project do not engaging the stakeholders in the different stages of project management thus, creating poor participants and influence of the important stakeholders (Löwstedt et al., 2018). Further, the role of stakeholders plays an imperative role in the development of the smooth relationship and the same impacts on the future plans, more specifically the external ones. It is imperative to understand the awareness and culture of the community of the stakeholders that can impact the different stages of road construction project management from one stage to another (Zou and Zhang, 2009; Chan et al., 2004). Thus, if the project is equipped with trained and skills consultants and contractors that can create a culture of analysis that further leads to accurate interpretation of the impact of stakeholders on the different stages of project management and thus, the

issues and challenges from the stakeholders can be minimized or reduced (Bhattacharya et al., 2012). This sheds light on the importance of identifying the stakeholders and analysing their to ensure accuracy in future actions and who to contact and what measures to take promptly wherever an issue arises in the project management (Betts and Lansley, 1993; Chan et al., 2004).

2.4 ISSUES/CHALLENGES BECAUSE OF LEGAL REGULATIONS AND FRAMEWORKS

Further, there are broad range of issues that take place such as time constraints, safety issues, lack of personnel on site, and the rapidly evolving scope of the work to be completed with a specified time period *(*Björk and Bröchner, 2007). Furthermore, there are issues that have the potential to impact the project indirectly such as the landscaping issues and proclamation issues that further attract legal issues and issues of compliance *(*Whyte, et al., 2008; Chan et al., 2004). Moreover, these issues further extend to the challenges and issues that need to be tackled with the properties along with way where the road construction project needs to take place to ensure the completion of the project (Löwstedt et al., 2018). There are issues of proclamation from the owners of the property from the owners if the claims are not done proper, thus inviting legal course of work to be completed before the project can proceed further (Whittington et al., 2006*).* Moreover, when the road construction projects are in the high growth phase because of the increasing number of projects that involve interaction with large scale infrastructure and housing projects that have resulted in many issues in the process of the road construction project delivery (Zou and Zhang, 2009). Some of the key factors that have results in these issues consist of the shortage of human skills, lack of capacity and issues with maintaining and managing qualitative standards (Thomas et al., 2006).

Similarly, there are a broad range of challenges that come as a result for government regulations and policies (Tah and Carr, 2000; Khoshgoftar et al., 2010). The severity of the issues increases where the project management team is passed on from one department to another (Söderholm, 2008; Chan et al., 2004). This can be elaborated with an example, even though predominantly the road construction is carried on by the department of transportation and road, the other governmental departments need to follow the same protocol such as the department of labour, therefore the contractors needs the construction work permit to initiate the range of construction activities (Sarkar and Panchal, 2015; Khoshgoftar et al., 2010). Along with this permit the contractor also needs the water licence

from the department of water affairs, and also tackle the environmental issues that impact construction with a significant impact and the process takes time for approval from several departments, moreover environment issues take place because of inclement weather, sedimentation and erosion (Zou and Zhang, 2009). Moreover, when the contractors fail to adhere to the environmental regulations this has the impact to delay the project or even result in the termination of the contractor from working in the future stages of the project, or even be imposed with fine and legal repercussions (Sage et al., 2012; Chan et al., 2004) . Furthermore, these delays result in the dissatisfaction of the client and citizens who were rather expecting benefits and better life on the competition of the project on the assigned deadline (Sachs et al., 2007). Furthermore, the project delays and overrun prove to be very costly for the contractors and the broad range of stakeholder associated with different stages with the project management (Biesenthal et al., 2018; Khoshgoftar et al., 2010). There are a broad range of challenges and constraints that are faced by the contractors, consultants, clients and stakeholders that have the potential to adversely impact the progress of the project or even cause it to fail (Zou and Zhang, 2009; Chan et al., 2004).

2.5 DESIGN RELATED CHALLENGES

Some of the challenges faced by the road construction projects in terms of design consists of lack of detailed specifications, poor design reflection, unrealistic specifications, predominantly because of the delays in the execution of the designs in different stages of the project and the continuous demand of the changes by the client (Pillai et al., 2002; Chan et al., 2004). This also results in the unprofessional design stops or delays in the execution of the project because the design is required to be continually reviewed, amended and accepted followed by continual approval for road construction works(Pietroforte and Stefani, 2004; Doloi et al., 2012). Further, where are errors detected in the designs the road construction work needs to be put on a temporary half until the errors rectified (Padalkar and Gopinath, 2016; Koushki et al., 2005). More often than not, the errors take place because of lack of identification of appropriate vendors and results in designs that does not fall in alignment with the expertise of the construction, because the design is not possible to construct on site (Zou and Zhang, 2009; Hossen et al., 2015). This further, impacts the time, quality and budgeting of the design problems that further have a high potential risk on the overall road construction project (Odeck, 2004; Jarkas, and & Haupt, 2015). Usually when designs are constructed by the consultants in the absence of the contractors the implications of the same becomes visible during the execution of the project (Löwstedt et al., 2018; Koushki et al., 2005; Doloi et al., 2012). Undoubtedly, one of the implications of the errors with designs is the cost overruns and turn out to be one of the key sources of wastages in

construction (Mezher and Tawil, 1998; Doloi et al., 2012; Koch et al., 2015). Furthermore, one of the key challenges because of the designs are the costs associated with variation works, or increase in the cost of the construction materials, along with delays in the drawings of the design, bankruptcy of the contractors or liquidation and similar overruns (Zou and Zhang, 2009; Doloi et al., 2012; Khoshgoftar et al., 2010; Chan et al., 2004).

2.6 CHALLENGES BECAUSE OF EVOLUTION OF KNOWLEDGE

More often than not, road construction projects are based on design specification as compared to performance specifications and prepared by consultants who are accountable for the road construction projects (Manelele and Muya, 2008; Doloi et al., 2012; Gustavsson and Gohary, 2012). Further, consultants are not accountable towards any risks in terms of designs and therefore tend to choose the tried and tested solution without any focus to the high costs of construction of road projects (Mahamid, 2014; Khoshgoftar et al., 2010; Gustavsson and Gohary, 2012). Moreover, the practitioner in the road construction project need to access to new knowledge and also need to keep abreast of the latest innovations (Mahamid, 2011; Koushki et al., 2005; Gottlieb et al., 2018). Some of the challenges the industry experts faced in this area is the limited capacity to upgrade the necessary skills required for the successful completion of road management projects (Löwstedt et al., 2018; Doloi et al., 2012; Gottlieb et al., 2018). This further undermine the engineering skills of many of the technical staff because of poor project specification and scoping (Clegg et al., 2018; Costa et al., 2006). One of the key challenges is the lack of knowledge in context of the skills and resources that is required to successfully implement the road construction projects (Buhl et al., 2017; Doloi, 2012; Flood and Issa, 2010). One of the key reasons for this is the contract that have been awarded to the inappropriate tender processes (Chau, 1997; Chan et al., 2004; Comi and Whyte, 2018; Davies et al., 2016). This is followed by the lack of experience employees who are capable to manage the road construction projects and the unwarranted time lags that takes place between the submission of the tender and award of the same (Zou and Zhang, 2009; Koushki et al., 2005; Chau, 1997; Doloi et al., 2012; Khoshgoftar et al., 2010).

2.7 CHALLENGES FACED BY CONTRACTORS

One of the key challenges faced by contractors is the lack of proper planning that even has the potential to lead to the road construction project failure because of the poor project management (Lin and Shen, 2007; Khoshgoftar et al., 2010; Ju and Rowlinson, 2014). It further has the potential to harm the entire nation as a whole in context of the infrastructural growth process (Ling and Lee, 2012; Comi and Whyte, 2018; Klitgaard et al., 2017). This

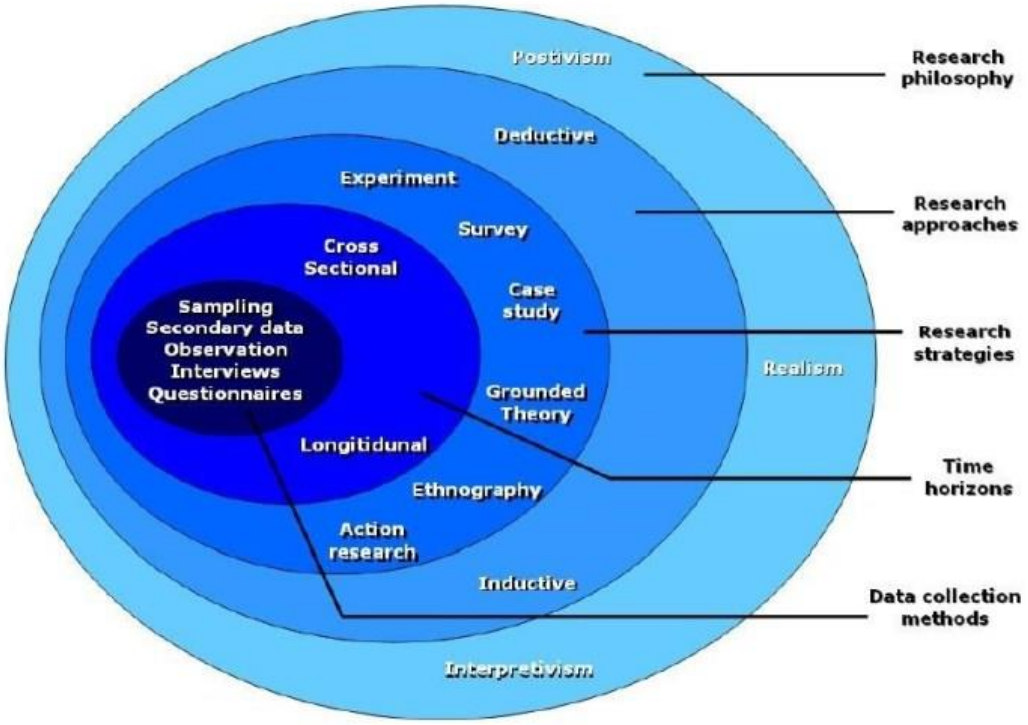
predominantly happens because of an adequate project control system, poor planning and lack of adequate work definition of the scope can lead to the delays in the project or rather failure of the entire project (Löwstedt et al., 2018; Chan et al., 2004; Iqbal et al., 2015).

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 INTRODUCTION

Research methodology can be defined as the strategy or rather an architectural design that works as blueprint for the researcher by mapping out the key approach to addresses the research questions (Buckley and Chiang, 1976). Further, Crotty (1998) argues that research methodology provides a comprehensive strategy to the researcher that presents a silhouette to the research choice with the help of the specific methods in context of the outcomes expected from the research questions (Wiles et al., 2011). However, it is imperative to bear in mind while deciding on the choice of research methodology to take into consideration the key characteristics of the research problem (Noor, 2008).

The current study has chosen qualitative research methodology to address the research objectives *(*Ulmer and Wilson, 2003). The primary justification for using this approach is because the research needs to investigate a new filed to and work towards theorizing the prominent issues (Corbin and Strauss, 2008; Creswell, 2007). The extant literature review presents a broad range of qualitative methods that have the potential to gather in-depth and extensive primary data and lead to the understanding of the key research problem (Creswell, 2007). This explains the decision of the researcher to qualitative data collection to employ a framework with the help of a qualitative interview with a framework that encompasses the practices and standards that not only help the interview to be recorded by also achieve, challenge and continually reinforce the same (Oakley, 1998). Furthermore, it is virtually impossible to carry out an interview without some kind of a structure, the decision was between a semi-structured, lightly -structured or an in-depth face-to-face interview (Mason, 1994). The in-depth interview do not completely lack structure, however, as part of the long-term field it provided an opportunity to the research to interact with the respondents and provide them with an opportunity to express themselves at their own pace and with their own approach with a minimum hold of the researcher on the respondents (Corbin and Morse, 2003). The study employs the Saunders Research Onion to present the current research methodology (Saunders et al., 2007). Saunders Onions helps to define the research methodology in layers just like the different peels of the onion, as presented in the figure below (Saunders et al. 2007).



The framework depicts the various stages to understand the development of the research work that was presented by Saunders et al., (2007). To further, elucidate this ever layer of the onion provides a detailed description of stages in the research process (Bryman, 2012). The endeavour of the framework is to go from outer most layer to the inner most layer of the research onion (Silverman, 2013). The first layer is the research philosophy that sets the stage to define the research process and the methods, followed defining the research strategy and the time horizons (Bryman, 2012).

3.1 PHILOSOPHICAL STANCE

The research philosophy helps to shed light on the set of beliefs in context of the characteristics of the reality being research (Bryman, 2012). To further elaborate it helps to define the nature of knowledge that help to address the study objectives (Goodard and Melville, 2004; May, 2011). The study selects between the three main philosophies, ontology, epistemology and axiology (Saunders et al., 2007). The current study chooses ontology as it is predominantly, the study of reality (Podsakoff et al., 2012). Rather, it provided an opportunity to the researcher to define the nature of reality, and the impact of a phenomenon on the society and environment (Mason, 1994). Moreover, from the position of the current study it is imperative is because it helps to understand how it has influenced the behaviour of people, for the purpose of the current study it is the project management team at different levels and how the hinderances and challenges in the process of the road construction project impacted them (Oakley, 1998). Further, from the ontological philosophical stand, there are three positions consisting of objectivism, constructivism and pragmatism (Ã–stlund, et al.,

2011). The three positions play an imperative role in understanding the reality and impact on the people in the environment (Goddard and Melville, 2004). Further, ontology helps to discern the reality and perception of reality (Noor, 2008). For the purpose of the current study, the philosophical stand chosen is objectivism because the key aim of the study is to understand the social event and the understanding of the people associated with the event. It further helps to discern the impact of the social phenomena to a broad variety of people (Noor, 2008).

3.2 RESEARCH APPROACH

There are two research approaches consisting of deductive and inductive that make the second layer of the research onion (Newman, 1998). Undoubtedly, the first layers have an impact on making a decision on the second layers and also helps to identify the research aim and the limitations of the study (Neuman, 2003). The deductive approach is predominantly to test the hypothesis based on the existing theory to formulate the research approach and test it (Silverman, 2013). The approach is more suitable to conduct statistical testing that required accepted level of probability (Snieder and Larner, 2009). Therefore, for the purpose of the current research the inductive research that allows the researcher to rather create a theory than work with the existing one (Monette, et al., 2005). Moreover, for the purpose of the current study is that inductive approach allows the study to start off with a specific approach, however, move to general (Bryman and Bell, 2011). With this approach the study is conduct with no solid framework to conduct the data collection, however the focus of the research is later formed after the data collection (Flick, 2011). Moreover, what is expected is that the new theory is generated with the findings from the data analysis, rather than trying to fit them in the existing ones (Bryman and Bell, 2011).

3.3 RESEARCH STRATEGIES

The research strategies help to understand the process on how the study has been carried out (Saunders et al., 2007). There is a broad range of strategies consisting of action, research, in-depth interviews, experimental research, action research, survey, case study research or a systematic literature review *(*May, 2011). The current study employs the in-depth interviews to conduct the primary data collection, because this approach of data collection is in alignment with the principles of ethnography that focuses on the use of the unstructured approach to focus on the local key informants to further focus on collecting data with the help of observation and recording field notes, and the maximum involvement of the researcher with the participants (Kothari, 2004). To further elaborate on this in simple words, this approach helped the researcher to conduct an unstructured interview just like holding a conversation rather than a formal interview, rather can be suggested a controlled conversation that is predominantly skewed towards the interest of the researcher (Gray, 2009). However, there is also an approach of non-directive interviews, a kind of an unstructured interview that allows the gather in-depth information without a pre-planned set of questions (Gray,

2009). However, for the purpose of the current study the researcher prepared an interview guide to ensure that the conversations do not digress from the key research objectives, at the same time had the flexibility to encompass interviews that were within the scope of the study and helps to address the research aim (Johnson et al., 2007). Thus, the unstructured, in-depth interview was still a formal conversational interview based on the set of planned question, yet has scoped for questions that were generated spontaneously during the interview (Gray, 2009).

It would be fair to imply that the current approach is between the type of unstructured interviews and the semi-structured interview where the respondents are provided with a set of open-ended questions and at the same time have their space and time to express what would base on their experience with the issues on hand that need to be addressed (Gulati, 2009). The approach of using the combination of two approaches that has been used extensively as an interviewing format to conduct face-to-face interviews with individuals (Corbin and Strauss, 2009). This approach of conducting the interview was conducted to meet the respondents only once and lasted for a period of 30 minutes to 45 minutes. The interview guide played an imperative role by providing a schematic presentation of the questions based on the topics that needs to be explored by the researcher to address the current research questions (DiCicco-Bloom and Crabtree, 2006). This also helped the researcher to make the optimum time of the interview and yet allowed the researcher to explore the respondents with a more systematic approach and yet be comprehensive to ensure that the interview is focussed on the desired line of action DiCicco-Bloom and Crabtree, 2006). The questions in the interview guide comprised of the core questions and further questions that were related to the research question that in turn helped to enhance the process with the help of the pilot study of the interview guide (Creswell, 2007).

Further, to ensure that interview data was capture with maximum efficiency, the researcher considered the recording of the interviews as an appropriate choice with the agreement with the respondents on the assurance of privacy and confidentiality (Gray, 2009). Moreover, the researcher took hand-written notes during the interview, however, they were not entire reliable because the researcher might have missed some key points in the process (Goddard and Melville, 2004). However, when the hand-written note, based on observation were complemented with the recordings of the interview, it made it easier and systematic for the researcher to decipher the interview content accurately with the verbal prompts and thus helped the transcriptionist to create verbatim transcripts of the interview (Flick, 2011).

3.4 TIME HORIZON

The time horizon helps to define the required time to complete study. Basically, there are two types of time horizon provided within the Saunders research onion, the cross-sectional and longitudinal (Bryman, 2012). The current study employs the cross-sectional time horizon where the data is collected within the existing period of time. Moreover, the longitudinal approach helps for the data collection where the researcher is in contact with the respondents over an extended period of time because the researcher wanted to study the changes in the respondents over a period of time (Goddard and Melville, 2004). As this study is required to complete the requirements of the assessment, the study is carried on in the current period of time and the research objectives do not demand the change to be observed in the period of time in the behaviour of the respondents (Bryman and Bell, 2011) .

3.5 RESEARCH CHOICE

This is the fourth layer of the research onion that helps to define the research choice. This explains the research choice whether it is quantitative, qualitative or a study that combines both *(*Buckley and Chiang, 1976). Thus, according to Saunders (2007) the research choice lies between the mono method, where the study uses either quantitative or qualitative methodology or a mixed method and combing both the quantitative and qualitative methodology to create a single dataset (Flick, 2011). Clearly, for the purpose of the current, the approach is of mono-methods, as the entire study is carried on with a qualitative approach (Feilzer, 2010).

3.6 DATA COLLECTION AND DATA ANALYSIS

This is the last and the inner most layer of the research onion. This stage plays an imperative role to ensure overall reliability and validity of the study (Saunder et al., 2007). It is imperative to conduct the data collection and the data analysis with a methodological approach (Bryman, 2012). This stage shed light both on data collection and data analysis approach to shed light on the sources of data, the sample, the sample size, ethics, and limitation, and most importantly the research reliability and validity (Corbin and Strauss, 2008). The study conducts an investigation with the people who worked with the projects closely as mentioned in the people who finished the contract in Chapter one. The aim is to understand the challenges they faced in alignment with the themes identified in the extant literature review on the challenges in road construction projects (Corbin and Morse, 2003).

3.7 DATA SAMPLE

The data is collected from the executives who have worked on different project towards the road completion project, there were five executives at a management level who have worked in the project in different capacities. The data sample has been chosen based on the convenience sampling with the executives involved with the different contracts discussed in chapter one in the Orbital Highway,

Qatar (DiCicco-Bloom and Crabtree, 2006). There was an endeavour made to contact the executive since October 2019 through emails and phone calls and as a final list five management level executives agreed to participant in the study. Therefore, the sample size for the study remains five. The researcher with their network in the road construction projects presently in the process and also completed projects in Qatar. This is the justification specifically to choose the Orbital Highway Contract 1. The endeavour is to collect data from road construction projects, to narrow down the focus and identify the challenges faced in the area of quality management. There was an endeavour made to build an acquaintance with the potential respondents on the phone and email to cultivate a relationship and explain them the significance of the investigation (Crotty, 1998; Feilzer, 2010; Gray, 2009). This has been done by explanation of the research aim and objectives. The study is conducted with the help of face-to-face interviews, with an interview guide that ensures that the investigation does not deviate from the study objectives (Creswell, 2007). The rest of the communication is conducted through emails to keep in arrangement of the busy project management team and yet continue to comprehend more about their experiences or seek clarifications on the primary data collected as yet (Creswell, 2007; Johnson et al., 2007; DiCicco-Bloom and Crabtree, 2006) .

3.8 ETHICAL CONSIDERATIONS, AND INFORMED CONSENT AND CONFIDENTIALITY

A consent form was provided to every respondent to achieve their informed consent with the help of two copies, one copy for the partaker to retain and second for the researcher to ensure records for ethical purposes (Podsakoff et al., 2012; Monette, et al., 2005; Neuman, 2003). The consent form further ensures the participants of the privacy and confidentiality and their capability to renounce from the research at any point of time (Flick, 2011; Kothari, 2004; May, 2011). Furthermore, an assurance was provided to the respondents that the information offered by them will be used only for the purpose of the current study and their identity will be not be revealed through their individual or industry information (Goddard and Melville, 2004; Noor, 2008). The consent form also ensures all the protection on how the data will be collected and saved, and destroyed after data analysis. The data has been stored in the computer owned by researcher with a password protection with absolutely no access to anyone else. Thus, this protects the will the videos, audio recording, emails, transcriptions and translation (Gulati, 2009; Mason, 1994; Corbin and Morse, 2003). Once the data analysis is done and the dissertation is submitted, everything will be destroyed (Bryman and Bell, 2011; Newman, 1998; Crotty, 1998). The form has been attached in APPENDIX 1. The researcher has taken every effort to take care of ethics to ensure no harm is done to the partakers, the environment, the industry or the society as a whole and also the endeavour of the study will only be to contribute positively without violating any ethical dimensions of the study (Bryman, 2012; Saunders et al., 2007; Corbin and Strauss, 2008; Ã–stlund, et al., 2011).

3.9 DATA COLLECTION

Data collection has been conducted through face-to-face interviews in the premises of the respondents (Creswell, 2007) . The interviews have been video recorded with the permission of the participants in Arabic language, that have been eventually transcribed and translated with the help of a professional transcriber with command over both English and Arabic language. This ensures the accuracy of the data collected in the interviews (Silverman, 2013). The researcher will ensure will take care in the process of analysis that none of the participants will be made traceable with any of the information shared by them (Ulmer and Wilson, 2003; Oakley, 1998) The researcher also took notes in the process based on the observation and also with an endeavour to make notes of the relevance of the responses and also to learn from their facial expressions and body language (Saunders et al., 2007).

3.10 CONCLUSION

Thus, drawing to a conclusion, this chapter presents the research methodology with the help of the Saunders' Research Onion (2007). The chapter has presented with the help of different layers on the critical examination of the onion to develop a research framework to conduct the investigation and meet the requirements of the key research objectives.

CHAPTER FOUR: ANALYSIS, DISCUSSION AND FINDINGS

4.0 INTRODUCTION

The analysis of the interviews indicates there are was a broad range of issues faced by the executives in the preconstruction stages of the road construction project. Some of the key issues identified pre-construction issues, issues with land surveying, investigations and issues with designs, and construction and contract management issues (Zou et al., 2007; Zou and Zhang, 2009; Zayed et al., 2008; Floricel and Miller, 2001).

4.1 PRECONSTRUCTION ISSUES/CHALLENGES

Some of the key challenges as cited in the interviews consisted of delay in land acquisition secondly handling the affected individual in terms of resettlement, shifting of utilities and tree cutting. Furthermore, the issues were the contractors were not equipped with an encumbrance free site in the initial stages of the road construction project and the mobilization of the same caused the delays to the contractors and the contractors were forced to use the mobilization advancements elsewhere (Löwstedt et al., 2018). Furthermore, another challenge cited was the outdated land records that made the acquisition of the land even more difficult (Clegg et al., 2018*).* Furthermore, on dimensions of quality, one of the challenges faced was the quality of the designs because many a times the acquisition of additional land demanded to take care of the designs at the same time and within the constrained time, the quality of the designs became compromised (Jarkas, and & Haupt, 2015).

There was a challenge cited that because of the improper demarcation that made it difficult to decide on the trees to be cut as a result of poor design drawings. What made the situation even more challenging was the continual challenges and delays to obtain the permissions and clearances from the Ministry of Environment and forests as a pre-requisite that took a lot of time before the trees could actually fell and in the same process there was a demand for the designs to be made available to the contractors (Zavadskas et al., 2010; Zhen-Yu and Lin-Ling, 2008; Wright, 2005).

Furthermore, there were challenges because of lack of adequate records on the underground utilities such as sewage lines, water supply, telephone cable and electrical lines *(*Björk and Bröchner, 2007). These utilities were identified as hinderances only during the initial stages of the road construction project. Moreover, there are challenges faced in the process of shifting the overhead electrical and telephone lines that had to take into consideration the polls. The process took a long time and was one the reasons of falling behind of the schedule (Löwstedt et al., 2018). Further, both the process and the delay of shifting the utilities were responsible for the hardship to the general citizens and

demanded for suitable alternative arrangements to be made in the process (Al Zubaidi and Al Otaibi, 2008; Baiden et al., 2006).

Furthermore, there were a broad range of government agencies were involved and had to be dealt with from time-to-time for approvals, clearances, and permission every time to either obtain or relocate the utilities. This took away considerate amount of time and also resulted in delays because of the cumbersome process and procedures involved and sometimes the relevant laws and regulations were not very lucid, further taking away more time (Thomas et al., 2006; Yildiz et al., 2014; Sage et al., 2012). In one of the instances cited by one of the participants, there were delays that took place in the process of handling over the encumbrance free land to the contractors and instead for the targeted 20 months, the process actually took 30 months cause shifts in the overall project. Even after there was complete access to the land there were further challenges that hindered the ability of the contractor to carry on work without any interruptions and continually till the time the milestone is achieved *(*Buhl et al., 2017). This resulted in a situation where substantial extensions were required to be provided to the contractors from time-to-time (Biesenthal et al., 2018) . The time over run resulted in the cost over runs and this resulted in the claims by the contractors for the resources of their time and utilities that were idea and they demanded for compensation for the same that further added to the cost over runs for the overall project (Betts and Lansley, 1993) .

4.2 DESIGN ISSUES, LAND SURVEYING AND INVESTIGATIONS

The land acquisition for the road construction project was carried in accordance to the laws and regulations of the national highways and land acquisition laws for the defined purposes and also takes care of the compensation, therefore. With the accurate implementation of the laws, the land acquisition processes should have taken 15 months, however it took 24 to 30 months in reality. Since it took such a long time to acquire the land, the process should have started much earlier or rather at the same time as the project design started, however, the land acquisition plans were prepared very late. Some of the reasons identified for the delay were outdated revenue maps that formed the basis of preparation of the land acquisition plans. Moreover, the records were not updated for a long period of time (Bhattacharya et al., 2012; Whittington et al., 2006). Moreover, many a times the land acquisitions plans were not really realistic because the predominantly the design consultants were equipped with inadequate expertise to prepare the required plans and designs. They were also not equipped to carry out the ground verification and alignment. There was a need to carry on frequent amendments in the alignments and the designs during the implementation stages from time-to-time. There were many situations where there were discrepancies within the broad range of project coordinates and this resulted a mismatch in many a times in the reference frame, thus demanding the redesign of the alignment of the coordinates. Moreover, the project management team had to rely on the broad range of human resources to interact with the revenue

authorities from time-to-time and these authorities were already over stretched and were not in a position to provide the required assistance in a timely fashion. The settlement process further prolonged the scheduled deadlines because of the lack of a clear guideline on offering compensation tin many cases and it was a significant challenge to work with the land owners with unclear titles or where there were more than one owners the settlement process took significantly longer period of time and caused delays for the project management deadlines. Moreover, there were issues along with the delays in resettlement because of delays in finalization of alignments and passageway during initial stages of the road construction project. There were also challenges because of the challenges in the delays that took place because of identification and in the process of finalization of the lists of the displaced individuals. This can be further elaborated that the list of the titled holders could be finalized only after the declaration of the awards by the competent legal authorities. This results in challenges for the preparation for the alternative land stages and further construction and contract management issues. Furthermore, there were issues identified because of weak contract management and enforcement environment with issues in the clarity of the independent engineers with many of the employers staff and domestic supervision consultants lacking adequate knowledge to understand the conditions of contract precisely that are required to be followed with the road construction projects. Moreover, there were continual challenges on the lack of adequate knowledge by employers and the contractors that further caused the delays in the completion of the schedule deadline (Iqbal et al., 2015) . This was further extended to understanding of the contract conditions by both the contractors and the employers. Because of this situation where the employer was not in a position to fulfil their obligations because of the lack of understanding of the terms of contract, this resulted in issues with the timely delivery of the encumbrance free land and this further resulted in issues with timely decision to make variation and timely payments with initial activation of the disputes resolution mechanisms to further resolve disputes with a timely fashion the leverage on the enforcement of the contract eventually got eroded (Chan et al., 2004) . This resulted in a situation where the employers' staff depicted resistance to accept responsibility to take timely decisions because of the fear and there was a situation where the employees tried to pass on the buck (Odeck, 2004).

Furthermore, there were some issues that took place because of lack of training to the employees and the staff that worked for the contractors on the general understanding of the terms and condition of the contracts. This made it further difficult for the parities to understand the division of the rights, duties and obligations that were clearly stated in the contract (Zeng et al., 2007) . This was one of the key situation that resulted in low morale and lack of motivation to treat project as one common objective and there were issues with the team spirits, where the game of passing on the buck became the norm, where no one wanted to take responsibility and rather kept shifting the blame on one other (Sachs et al., 2007).

Moreover, there were challenges on the adequacy of the management skills available and this impacted the contractor performance and further impacted the contractors work planning schedule, workflow management, resource planning, cash flow management and overall management (Lin and Shen, 2007). The contractors has won the contract with the bids with their lowest quotes and therefore always try to make financial capital with the help of claims at an eventual date because they aware of the fact that the employers will definitely provide them many opportunities to do so specifically because of the delays and overruns in the making of the available land along with the delays in payments that further lead to the delays in decision making. Moreover, one of the challenges cited in the study was pertaining to the role of independent engineers because they role tends not to be defined very clearly, therefore whatever happens the engineers take no responsibility of the overruns and delays (Koushki et al., 2005). Moreover, the engineers are not responsible or accountable after the completion of the road construction projects as the role of the engineer simply gets over. Furthermore, there were challenges with the supervision consultancy contracts because these contracts specifically are time based and this generates a wilful incentive to delay the decision-making process because the extensions in the civil works and eventually the extension of the road construction contracts (Costa et al., 2006). Moreover, the staff are not full conversation with the complete conditions of the contracts and the same tends not to be up to date with the new technologies and the latest quality management techniques. This results in a situation where the project management team becomes handicapped to manage the contracts effectively and efficiently with a timely manager that also impacts the quality of decision-making (Chau, 1997) .

Further, the delays in construction created a significant gap between the allocated budget and the actual expenditure on the road construction project in the different phases of project management. The gap was between 10-15% and nearly 30% of the contracts were delayed and nearly 40% of the contract suffered the cost over-run of over 20% and the key impact was the overrun of nearly 25% of the original contract completion time. There was always a need felt to find an early solution to ensure time completion of the road construction project in different stages well in time (Tah and Carr, 2000).

4.3 STAKEHOLDER MANAGEMENT

The road construction project has been one of the major projects and undoubtedly it comprised of a broad range of stakeholder that need to be consulted from time-to-time (PMI. 2017). It was a significant challenge to understand their requirements and also the need to take their inputs from time-to-time for different phases of project management. It was further challenging to obtain their approvals to proceed into different stages of construction (Schmeer, 1999). The findings of the study indicate challenges from both the internal and

external group of stakeholders that consisted of different department, utility authorities, ministries and private entities (Bourne and Walker, 2005).

With the size of the road construction project, it was challenging to manage a multi-discipline of stakeholders that led to approval challenges in different challenges across the different stages of the project management within the different construction and design interfaces (Bourne and Walker, 2005). However, on a positive note these experiences become the guidelines for the rest of the project management phases. Some of the key challenges took place because of the lack of understanding of the multi-discipline engineering infrastructure that influenced each other in the design development phase of road construction project (PMI. 2017). Every phase had issues with traffic on the road, structural engineering, issues with utilities and issues with team working with their project control and management teams (Bourne and Walker, 2005). There were multiple interfaces that faced challenges because of the need of the effective collaboration during the design phase and the different phases of construction (Schmeer, 1999).

Some of the challenges cited by the participants consisted of issues in dealing with the multi-discipline interfaces with the work on the initial traffic analysis that demanded the production of the conceptual designs and understanding of the road geometry (Schmeer, 1999). Furthermore, there were issues with both new and existing variations in the utility corridors with large multiple structure consisting of tunnels and bridges (Mitchel et al., 1997). Furthermore, there were limitations on the land acquisitions because of the environmental impacts, there were demands for improving the road safety and integration with the different public transformation modes (PMI, 2013).

There were challenges faced to ensure proper risk management and control within the overall cost and schedule (Mitchel et al., 1997). This further demanded the broad range of engineering disciplines to collaborate to ensure the completion of the different stages within the allocated budget and the defined time-frame. Every stage and every engineering discipline required the approval from the range of stakeholders (PMI. 2017).

However, it is also worthy to shed light on one of the key challenges cited by the participants. Even though there were many challenges and issues in dealing with the stakeholder (PMI, 2013). One of the key challenges was to understand the full scope and scale of all the stakeholders involved with the road construction project (Schmeer, 1999). There were more than ten internal stakeholders in terms of sections and departments and over thirty external stakeholders that consisted of the authorities, utilities, and private entities (PMI. 2017). It

was a significant challenge to ensure the collaboration of the different stakeholders during the duration of the project management starting from the design stage up until the road construction (Mitchel et al., 1997). Some of the challenges cited by the respondents consisted of identifying the specific stakeholders and the influence of ever stakeholder on the different stages of project management (PMI. 2017). There were stakeholders with different levels of power and influence and it came as either a support of opposition to many of the decisions on the project. However, on a positive note, the participants also cited that the stakeholders provided their expert opinions, extended their support and time-to-time offered supports, as long as they did not have direct interest in the delivery of the project outcomes (Mitchel et al., 1997). Moreover, there were stakeholder that need to be updated and informed as it influenced their own activities based on the work to be completed (PMI, 2013).

Further, the participants cited challenges while implementing the memorandums of understanding because it required the approval of many of the stakeholders. However, once the issues were settled it helped to ensure better collaboration and understanding between the stakeholders (PMI. 2017). Overall, the participants cited their challenges and complexities that come in the project communication because of the multi discipline interfaces and there was communication required with multiple stakeholders (PMI, 2013). The challenges were more complex while the project was ready with the deliverables within the available resources and the time-frame (Schmeer, 1999).

Furthermore, there were challenges because the different stages of the project were so face paced with rapid evolution and constant changes in the different requirements and sometimes these changes were not define accurately (Mendelow, 1981). This resulted in ambiguity, misinterpretations and miscommunications that further increased the complexity of the project being delivered on time within the allocated budget (Mendelow, 1981). Moreover, with the increase in the number of communication channels the project complexities increased and caused delays in project approvals (PMI, 2013).

Further, one of the key findings consisted of working with people within the multicultural environment and people on the project coming from across the world. This further led to complexities in the way people communicate and relate to each other (Mendelow, 1981). One of the challenges was the lack of cultural awareness that was required to understand the differences between individuals, groups, and organization to adapt and align with the project's communication strategies (PMI, 2013). This resulted in many misunderstanding

and miscommunication because of the cultural differences and lack of cultural awareness and cultural sensitivity made communications a challenge (Schmeer, 1999).

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.0 CONCLUSION

The study draws to the conclusions and based on the investigations and deliberations draws to the conclusions followed by recommendations. The findings indicate that the road construction projects in its various phases demanded modification to the existing roadways and in the process of planning, operations and maintenance of the key project they were presented with many opportunities to improve the ecological conditions of the existing roads, along with the opportunity to improve the terrestrial habitats (Padalkar and Gopinath, 2016) . Some of the key challenges that come into existence were because of the socio-economic conditions that hindered the planned boundaries because of the associated environment consideration (Comi and Whyte, 2018). This resulted in the imbalance between the planning scales and the longitudinal scale and impacted the road construction projects (Lundin et al., 2015). Some of the key reasons identified for the same were the lack of adequate legal incentives or rather disincentives to make the road projects accountable towards the environmental effects that extend beyond the political jurisdictions (Klitgaard et al., 2017). This created a situation for the project management team to restrict their decision making confided to the local standards. The issues in the ecological domain have been broader than the road construction project itself and that explains their need to extend beyond the regional planning domain (Löwstedt et al., 2018). The project has endeavored to address the ecological effects of the

road construction generally well and the results of the same are well documented too. However, the findings of the study indicate that there have been some a few integrative and large-scale challenges that were not known in advance, that explains some of the challenges to go undetected (Ju and Rowlinson, 2014). However, the project management team has successfully addressed the complex range of the broad range of effect of the environment of the road construction projects on intermittent periods with a range of variability. One of the findings of the study indicates that the project management has predominantly worked on understanding the direct impact of road construction projects and that has primarily been used on a protected resource, however there is still lack of documentation on the indirect and cumulative effects that have substantial (Ling and Lee, 2012). The incremental impact of the impact that have been ignored have been significant over a period of time on the resources required to carry on with the road construction.

Moreover, one of the challenges faced by the project management was the lack of adequacy to ensure the requirements of rapid assessment, along with insufficient methods to collect data for the same. However, on a positive note, the project management team was equipped with monitoring tools that sense remote data, produced analysis and modelling that help with the compiling to continually being improved (Davies et al., 2016) . Moreover, the project management was equipped with advanced technologies that helps to have access to a broad range of tools that have allowed substantial improvement in the environmental assessment of the road project (Doloi et al., 2012).

Except for managing the legally marked ecological resources to protect the endangered and threatened specifies the project did not face a significant deal of social or scientific challenges that affected the road construction projects and did not take away a significant amount of project management time. Furthermore, the project successfully integrated the road construction needs to integrated the road management objectives within the project management team. Furthermore, the project management system offered the opportunity to take into consideration the issues in the early planning stages itself and addressed many of the concerns till the later stages of project development (Hossen et al., 2015). There were issues such as the transportation system, the type of fuels, the types of vehicles that will continue to involved and the project management team till the end had to deal with the issues such as changes in the traffic volume, changes in the road capacity because of the widening of the roads as part of the road construction project.

5.1 RECOMMENDATIONS

The study ends with recommendations that can be useful for the project management team and the policy makers. The findings of the study indicate that there is a broad range of opportunities that come up intermittently that can help to either reduce or mitigate the adverse environmental impact in the process of modification and repairs carried to the existing roads (Koch et al., 2015). It is imperative to take into consideration the environmental consideration while making these plans as

part of the project management to both repair the existing roads and also to make new roads as part of the project management teams.

Further, focus on ecological impact should be designed should be taken into consideration at different levels of organizations to take into consideration a broad range of factors such as populations and species, genetics, ecological systems and communities (Löwstedt et al., 2018).

Furthermore, there is a need to take into consideration the long-term and large-scale ecological impact of road construction consisting of ecoregions, watersheds, and specifies ranges. Moreover, it is imperative for the project management team to focus on enhancing their understanding of the cross-scale internationals.

This further emphasis on integrating the roe of road ecology with the long-term ecological component of road construction project both for the existing one and also consider the need for the new ones (Gottlieb et al., 2018).

It is also imperative to conduct the assessments for the road construction project to be conducted intermittently to address the issues on the key ecological system, structures and processes. This requires the project to develop a robust set of ecological indicators that help the project management team to evaluate the long-term chance in broad range of ecological conditions (Flood and Issa, 2010.

Further, there is a need to develop a system to predict plan, monitor and evaluated the cumulative impact of the road construction projects with an appropriate scale of evaluation that had the potential to cross the state boundaries and specifically in these cases, the state and government agencies play an imperative role of collaboration and cooperation (Doloi, 2012).

Clearly, there is a need for improvement and assessment methods to collect days with the explicit models. Therefore, there is a need for the checklist to address the potential impacts of the road construction projects that are available for rapid assessment. This checklist will play an imperative role to focus on the issues of greater concerns with cooperation of the national effort to develop a standard protocol for data collection with the rapid screening and assessment approach to test the environmental impacts of road construction projects (Gustavsson and Gohary, 2012). A greater support is required to develop and maintain ecological impacts across the different levels of laws and regulators sources to be interfaced with the road construction projects (Löwstedt et al., 2018).

A new conceptual framework can help to improve the role of ecological consideration into the planning of road construction projects based on the integration of the ecological objectives and the role of performance indicators.

Further, the development of improved models and a broad range of modelling approach can help in understanding beforehand with the environmental conditions that impact the road construction projects and at the same time also help to enhanced the communication with the technical team and work as a guidelines for the future project to management the impact of the environment (Gustavsson and Gohary, 2012).

It is also imperative to take into consideration the protocol to ensure greater levels of protection that also takes into consideration the socioeconomic aspects of the road construction project management. This required the technical guidance, policies, and regulations to be taken in to consideration.

Moreover, monitoring systems can be developed to evaluate the impact of effects the results that emerge from the changes in the road construction projects such as the traffic volume, structural modifications vehicle mix and adjustments to network that need to be evaluated over the long-term (Gustavsson and Gohary, 2012).

It is imperative for the road construction project management teams to study on the ecological impacts of building new roads to be accessible through scientific approach or with the help of peer reviewed venues. The high administration in collaboration with state and federal resource management agencies can play a key role to develop and supply environmental information with the decision support system in the accessible databases.

Furthermore, the project management team can collaborate with the transportation agencies to extend their role beyond the existing role as engineers and planners and rather increase their role as coordinators of environmental stewards. Furthermore, natural resource planners need to collaborate with the endeavour to promote the integrated planning within the defined scope of the project and the scale to support mutual objectives (Gustavsson and Gohary, 2012). The collaboration needs to come from the country, state and federal government agencies, along with the support of the non-governmental organizations and environmental groups that have a stake in road construction. The government can stimulate the approach by providing incentives, such as funding and technical support that can be offered to the road construction project management teams in different stages of project planning that will help the team to further understand the ecological structure and functions across the states and yet work and interact harmoniously with the cooperation of the mutual interest (Sarkar and Panchal, 2015).

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APPENDIX 1: ETHICS FORM

?

Ethical opinion form for Faculty of Business and Law (BAL) taught

Undergraduate and postgraduate students (except MRes)

Instructions to student

The questions starting on the next page of this form should be completed by the student on relevant dissertation / project units requiring the completion of an ethics form, regardless of whether you are collecting primary or secondary data. Refer to the Guidance Notes that

accompany this form and the 'Research ethics – issues to consider' checklist, also to be found

As an appendix to the Guidance Notes, for help in completing the form. If you are not collecting

primary data or data that are identifiable with individuals, then you still need to complete an ethics form, but only need to answer Qs 1-4, then Q11 and as many of the questions between Qs 12-20 as are relevant in your case. The completed form, and any supporting documentation you intend to issue to participants, should then be passed to the supervisor. If your supervisor is satisfied that your application is capable of review, the usual procedure is that he / she will send it to an appointed independent reviewer to decide whether ethical approval can be supported. The reviewer, in conjunction with the supervisor, is responsible for approving the

Ethical dimension of your project, although you may be asked to amend your documentation to the satisfaction of the reviewer before a favorable ethical opinion can be granted.

No data collection or recruitment of potential participants must be undertaken before a final version of this form has been approved.

A favorable ethical opinion means that, *as long as you conduct the study in the way that has been agreed*, then you have ethical approval. If you subsequently do something other than what has already been agreed, then you no longer have ethical approval and would face the appropriate penalty. If you need to apply for subsequent changes to your project after having been given initial ethical approval, please fill in an 'Amendment' at the end of this form and reapply via your supervisor.

If, following the completion of the review process, your supervisor and, where relevant, any independent reviewer is unwilling to grant you a favorable ethical opinion, you have a right of appeal to BAL Faculty Ethics Committee. If you wish to exercise this right, your supervisor should email the Faculty Ethics Administrator, stating your name, HEMIS no., the relevant unit and course, and briefly stating the grounds for requesting that BAL Faculty Ethics Committee review the decision. Your supervisor should attach your completed ethics form and any supplementary documentation and include any relevant correspondence about the case.

A final signed and dated version of this form must be included in the file of the dissertation you are required to submit electronically. The form MUST be signed and dated by 1) the student, 2) the supervisor and 3) the peer ethics reviewer (unless the University has specifically previously agreed that the supervisor alone can sign off). If the dissertation is submitted without a fully completed, signed and dated ethics form it will be deemed to be a fail. Second attempt assessment may be permitted by the Board of Examiners.

1. What are the objectives of the dissertation / research project?

To conduct an investigation into the issues facing quality in road construction projects in Qatar.

To achieve the research aim the study works with the following objectives:

1. To investigate the factors that have resulted in key issues in road construction projects in Qatar for the Orbital highway for the period of 2014-2019.
2. To investigate how does the projects management overcome these issues.
3. To recommend strategies that can help the project management to avoid or overcome these issues in the future. Constructions project

2. Does the research involve *NHS patients, resources or staff*? YES / NO (please delete as applicable).

If YES, it is likely that full ethical review must be obtained from the NHS process before the research can start. Please discuss your proposal with your Supervisor and/or Course Leader and consult the Guidance Notes for this ethics form.

NO

3. Does the research involve MoD staff? YES / NO (please delete as applicable).

If YES, then ethical review may need to be undertaken by MoD REC. Please discuss your proposal with your Supervisor and/or Course Leader and consult the Guidance Notes for this ethics form.

NO

4. **Do you intend to collect *primary data* from human subjects or data that are identifiable with individuals? (This includes, for example, questionnaires and interviews.) YES / NO (please delete as applicable)**

If you do not intend to collect such primary data then please go to question 11.

If you do intend to collect such primary data then please respond to ALL the questions from Q5 onwards. If you feel a question does not apply then please respond with 'n/a' (for 'not applicable').

YES

5 How will the primary data contribute to the objectives of the dissertation / research project?

The aim is study the experiences of the project management while completing the Orbital Highway project for the period 2014-2019, to know the difficulties they have faced in construction projects, the same will be studies against the literature review, on how the developed nations cope up with similar challenges, to arrive at the best practices for the construction projects in Qatar.

6. What is/are the *survey population(s)*?

The aim is to conduct five face-to-face interviews with five project managers team who worked in the project with the consultancy team, the legal team, the stakeholder management team, the contractor team.

7. a) How big is the *sample* for each of the survey populations, and b) how was this sample arrived at? (Please answer *both* parts of this question.)

It is primarily because of convenience sampling and the contacts of the researcher in the road construction industry associated with the Orbital Highway, Contract 1, Qatar, it been possible to communicate with the five project managers, and also other members of the team who have express their interest to participate in the study. So, the endeavor is to conduct interviews with five project managers total sample size of five participants to build a representative data population. This would help to understand the experience of the overall project management team at different levels towards the completion of the Orbital Highway.

8. **How will respondents be a) *identified* and b) *recruited*? (Please answer *both* parts of this question.)**

The researcher has a network in the road construction projects currently in the process and also complete projects in Qatar. That's why researcher has specifically chosen the Orbital Highway Contract 1. The endeavor is to collect data from road construction projects, to narrow down the focus and identify the challenges faced in the area of quality management. The researcher proposed to contact the prospective candidates via phone initially and email to develop a rapport before the conduct of the face-to-face interviews and explain them the importance of the research. This will be done by explaining them the research aim and objectives. If they agree to participate, the study will be conducted with the help of face-to-face interviews, with an interview guide to ensure that the research does not digress from the research objectives. The rest of the communication will be conducted via email to keep in alignment of the busy project management team to understand more about their experiences or seek clarifications on the primary data collected as yet.

9. What steps are proposed to ensure that the requirements of *informed consent* will be met for those taking part in the research? If an Information Sheet for participants is to be used, please attach it to this form. If not, please explain how you will be able to demonstrate that informed consent has been gained from participants.

A consent form will provided to every participant, to gain their informed consent in two copies, one copy for the participant to retain and one for the researcher to ensure records for ethics purposes. The consent form will also ensure the participants of the privacy and confidentiality and their ability to withdraw from the research at any point of time with a further assurance that the information shared by them will be used only for the purpose of researcher and nowhere there identify will be revealed through their personal or industry information. The consent form will also ensure all the protection to how the data will be collected and saved, and destroyed after data analysis. The form has been attached in APPENDIX 1.

10. How will *data* be *collected* from each of the sample groups?

Data will be collected through face-to-face interviews in the premises of the participants. The interviews will be video recorded with the permission of the participants in Arabic language, that will be later transcribed and translated with the help of a professional transcriber who has command over both English and Arabic language to ensure the accuracy of the data collected in the interviews. The researcher will take notes in the process to make notes of the relevance of the responses and also to learn from their facial expressions and body language.

11. a) How will *data* be *stored* and b) what will happen to the data at the end of the research? (Please answer *both* parts of this question.)

The data will be stored in the laptop owned by researcher, which is password protected with no access to anyone else. This will include the videos, audio recording, emails, transcriptions and translation. Once the data analysis is done and the dissertation is submitted, all of this will be destroyed. *Data should be retained for 10 years, according to the university policy.*

12. What measures will be taken to prevent unauthorised persons gaining access to the data, and especially to data that may be attributed to identifiable individuals?

All the information gathered will be stored in the laptop that is password protected, the laptop always will be in the drawer that is locked, kept in the secured room where the researcher resides and will also conduct the study. Thus, there are several layers of security. There will be endeavor to password protect ever file and folder stored digitally.

13. What steps are proposed to safeguard the *anonymity* of the respondents?

This steps will take care in the process of analysis, where none of the participants will be made traceable with any of the information shared by them.

14. Are there any *risks* (physical or other, including reputational) *to respondents* that may result from taking part in this research? YES / NO (please delete as applicable).

If YES, please specify and state what measures are proposed to deal with these risks.

NO

15. **Are there any *risks* (physical or other, including reputational) *to the researcher or to the University* that may result from conducting this research? YES / NO (please delete as applicable).**

If YES, please specify and state what measures are proposed to manage these risks.

NO

16. **Will any *data* be *obtained from a company or* other *organisation*? YES / NO (please delete as applicable) For example, information provided by an employer or its employees.**

YES. The researcher expects to collect information about the project and the organization to understand the road construction projects.

17. **What steps are proposed to ensure that the requirements of *informed consent* will be met for any organisation in which data will be gathered? How will *confidentiality* be assured for the organisation?**

Consent form to ensure privacy, confidentiality and use of the information provided only for the purpose of the current study.

18. Does the organisation have its own ethics procedure relating to the research you intend to carry out? YES / NO (please delete as applicable).

If YES, the University will require written evidence from the organisation that they have approved the research.

NO

19. Will the proposed research involve any of the following (please put a √ next to 'yes' or

'no'; consult your supervisor if you are unsure):

- Potentially vulnerable groups (e.g. adults unable to consent, children)? YES ☐ NO ☑
- Particularly sensitive topics? YES ☐ NO ☑
- Access to respondents via 'gatekeepers'? YES ☐ NO ☑
- Use of deception? YES ☐ ☑
- NO Access to confidential personal data (names, addresses, etc)? YES ☑ NO ☐
- Psychological stress, anxiety, etc.? YES ☐ NO ☑
- Intrusive interventions? YES ☐ NO ☑

If answers to any of the above are "YES", please explain below how you intend to minimise the associated risks.

The researcher will take every endeavor not to make the participants traceable because of their name or their industry in the data analysis and the protection of the information is also ensured.

20. Are there any other ethical issues that may arise from the proposed research?

The researcher has taken every endeavor to take care of ethics to ensure no harm is done to the participants, the environment, the industry or the society as a whole and the endeavor of the study will only be to contribute positively without violating any ethical dimensions of the study.

APPENDIX 1

Consent for Participation in Research Interview

A STUDY TO CONDUCT INVESTIATION INTO THE CHALLENGES FACED BY ROAD CONSTRUCTION PROJECTS IN QATAR

1. I agree to participate in a research project conducted by conducted by the researcher for the completion of dissertation for University project.

2. I have received adequate information on the study project and understand my contribution in it. The purpose of my participation as an interviewee in this project and the future processing of my personal data has been explained to me and are clear.

3. My participation as an interviewee in this project is completely voluntary. There is no explicit or implicit coercion whatsoever to participate.

4. Participation involves being interviewed by

    a. Researcher for the purpose of an education study.
    b. The interview will last approximately 40 minutes.
    c. I allow the researcher(s) to take notes during the interview. I also may allow the recording of the interview and subsequent dialogue by audio/video tape.
    d. It is clear to me that in case I do not want the interview and dialogue to be taped I am fully entitled to withdraw from participation

5. I have the right not to answer questions. If I feel uncomfortable in any way during the interview session, I have the right to withdraw from the interview and ask that the data collected prior to the withdrawal will be deleted.

6. I have been given the explicit guarantee that the researcher will not identify me by name, role, and project role in any analysis, findings and the final report using information obtained from this interview, that my confidentiality as a participant in this study remains secure. Personal data will be processed in full compliance with the Data Protection Act 2018.

7. I am assured that this research project has been reviewed and approved by the Research Ethics Committee. I can contact the university Ethics Committee may be contacted through email for any questions concerning ethics.

8. I have carefully read and fully understood the points and statements of this form. All my questions have been answered to my satisfaction, and I voluntarily agree to participate in this study

9. I obtained a copy of this consent form co-signed by the interviewer.

Participant's Signature **Date**

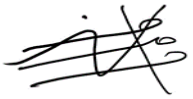
04/May/2020

Researcher's Signature **Date**

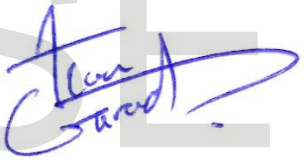
For further information, please contact:

DISSERTATION SUPERVISOR [email]

5

	Print name signed	Signature	Date
Student	Hamdan AL-Mulla		4 May2020

I / we grant a favourable ethical opinion:

Supervisor	Dr. Alaa Garad		5/5/2020
Peer reviewer (unless University has agreed that supervisor can sign off)			

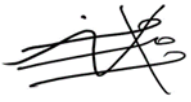
AMENDMENTS

If you need to make changes please ensure you have permission before recruiting any participants and any primary data collection. If there are major changes, fill in a new form if that will make it easier for everyone. If there are minor changes then fill in the amendments (next page) and get them signed before the primary data collection begins.

CHANGES TO ETHICS PERMISSION

VERSION: ___

Please describe the nature of the change and impact on ethics:

	Print name signed	Signature	Date
Student	Hamdan Al-Mulla		4May2020

I / we grant a favourable ethical opinion:

Supervisor

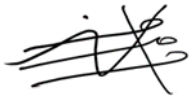
Peer reviewer (unless University

has agreed that
supervisor can sign
off)

(please cut and paste the next section, together with the heading at the top of this page, as many times as required)

VERSION: ___

Please describe the nature of the change and impact on ethics:

	Print name signed	Signature	Date
Student	Hamdan Al-Mulla		04 May 2020

I / we grant a favourable ethical opinion:

Supervisor _____

Peer reviewer (unless University has agreed that supervisor can sign off) _____

APPENDIX 3: QUESTIONNAIRE

1. What is your position?

2. What was the tenure you worked?

3. Which team did you work for?

4. What were the pre-construction issues and challenges?

5. What where were the challenges in the stakeholder management?

6. What were the design related challenges you faced in your tenure?

7. What were the challenges because of the laws and regulations?

8. What were the challenges you faced because of evolution of knowledge and technology?

9. What were the challenges you faced because of contractors and suppliers?

10. What were the cost escalations and quality issues?

APPENDIX 4: INTERVIEW TRANSCRIPTION FOR RESPONDENT 1

1**. What is your position?**

PROJECT MANAGER

2. What was the tenure you worked?

3. Which team did you work for?

4. What were the pre-construction issues and challenges?

The issues were very typical that take place in the road construction project, however, the difficulties and challenges were present along with the socio economic stress and some of the. Chronic shortage, of the institution's weakness and some of the inabilities of the project management team to deal with some of the key issues.

5. What where were the challenges in the stakeholder management?

Some of the key challenges with the stakeholder management consisted of that the focus was entirely on the stakeholders that were considered as key stakeholders with focus on the elements of power, urgency and legitimacy. The issue was that latent stakeholder were not given significance and that created the problems in many stages of project management.

6. What were the design related challenges you faced in your tenure?

There were many issues on design related issues, some of the challenges were because of the remarkable alternations in the designs and required dramatic changes in context of the organizational structure and knowledge representation. However, on a positive note this resulted in the shortened value chain and help to meet the client demands with consistency and

focus on quality because of the standardized process management and efficient and effective control of time management and efficient use of other resources.

7. What were the challenges because of the laws and regulations?

Some of the challenge were with the environmental issues impacting the construction industry as a whole and the alternations that were taking place from time-to-time with the proposed amendments. Moreover, the improvements in the fuel economy as a nation resulted less revenue on taxation and impacted the national transportation system and that impact the funding available to the government.

8. What were the challenges you faced because. of evolution of knowledge and technology?

The project management team had to face challenges because of issues with climate change and Green House Gases (GHG) that presented many cost efficient opportunities for the projects in terms of cost reductions. We had pressure to reduce emissions by 40% as compared to the current levels and not to impact the natural capacity of the earth. The emphasis was to use the low carbon (LCB) to ensure minimum carbon to be realized during the tenure of the project management.

9. What were the challenges you faced because of contractors and suppliers?

There were many challenges because of the inability of the specialist contractors and subcontractors to carry on the construction processes as per the procurement to improve value

for the project and the integration with the balance of the supply chain. Rather the subcontractors and the key contractors had their self-interests that it was challenging to work collaboratively and achieve the project goals.

10. What were the cost escalations and quality issues?

Some of the issues consisted of change order changes, there were financial challenges faced by the contractors that kept happening frequently and were the key reasons that caused scheduled overruns. There were other issues such as poor financial management and one of the key factors that caused quality shortfalls for the road constructions. However, these issues were overcome with the appropriate project management practices and training and helped to execute many of the stages of the project eventually successfully

APPENDIX 5: INTERVIEW TRANSCRIPTION FOR RESPONDENT 2

1. What is your position?

PROJECT MANAGER

2. What was the tenure you worked?

3. Which team did you work for?

4. What were the pre-construction issues and challenges?

Some of the pre-construction issues for the road construction project consisted of delays in the process of acquiring, land, conducting the settlement of the individuals who were impacted and further delays because of shifting of utilities. The site were not encumbrance free and therefore couldn't be allocated to the contractors straight away in the initial stages of the road construction project. This also led to the contractor issues that caused delay in the mobilization of the utilities and the money given to the contractors as advance was used somewhere else. Moreover, there were issues because of outdated land records that caused delays in the initial stages and impacted on the poor quality of designs. There was always a requirement for additional documents for the designs to come in alignment

5. What where were the challenges in the stakeholder management?

We had persistent issues with this aspect of project management because of the disagreements amongst the stakeholders in most essential parts of project management. The disagreements were because of designs, allocated budget and time. There were always issues because of the

power, influence and poor participation of the stakeholders in the project and it was a challenge to keep the internal and external stakeholders happy.

6. What were the design related challenges you faced in your tenure?

I have explained this in the earlier section, however, design related challenges took a long time and the process could have started much earlier and there were many things that could have been carried out along at the design stage. However, the land acquisition was prepared very late and this impacted the design stages.

7. What were the challenges because of the laws and regulations?

There were a number of government agencies involved and its was a tedious and time consuming process to achieve approvals, clearances, permissions before the utilities can be used, shifted or relocated. This took a great deal of times. The procedures were cumbersome and sometimes it was very difficult to understand the relevant laws.

8. What were the challenges you faced because of evolution of knowledge and technology?

9. What were the challenges you faced because of contractors and suppliers?

As I explained earlier on, the encumbrance free site was not accessible to the contractors in the initial stages of the road construction project there was a lot of delay and a lot relationship with the contractors were spoiled.

10. What were the cost escalations and quality issues?

The delay in the project caused issues with the budget allocation and actual expenditure, the contracts were delayed and there were cost over runs.

APPENDIX 6: INTERVIEW TRANSCRIPTION FOR RESPONDENT 3

1. What is your position?

2. What was the tenure you worked?

3. Which team did you work for?

4. What were the pre-construction issues and challenges?

The rising cost of the labor and material, just after we budgeted. Moreover, there was so much competition that left us with limited profitability margins. Also, there were new rules and regulations that changed and we had certain issues with building codes and fixing the recent taxation reformations.

5. What where were the challenges in the stakeholder management?

It was a significantly challenges coordinating and organizing the approvals of the stakeholders in the different stages of project management.

6. What were the design related challenges you faced in your tenure?

There were issues because of the lean construction practices and design build that demanded a high level of communication and collaboration with the stakeholders and many parties involved with the construction project that impacted the productivity and efficiency.

7. What were the challenges because of the laws and regulations?

8. What were the challenges you faced because. of evolution of knowledge and technology?

We had challenges in understanding and using technology that consisted of building information modelling. Similarly, there was a broad range of project management software and many tools that we wanted the contracting firms to use to bolster productivity.

9. What were the challenges you faced because of contractors and suppliers?

Ensuring the worker safety levels by the contractors was one of the key issues, and the number of worker deaths because of the same. There have been a few workplace injuries and illnesses that continue to grow. It is imperative that we project our workers and keep the workplace safe against the accident and injuries.

10. What were the cost escalations and quality issues?

One of the key challenges was the labor shortages that hindered quality and productivity, there was a lot up caution required to do be done to done the experience and the skills of the laborers' and the contracting firms to bring the quality of their performance in par with the project objective.

APPENDIX 7: INTERVIEW TRANSCRIPTION FOR RESPONDENT 4

1. What is your position?

2. What was the tenure you worked?

3. Which team did you work for?

4. What were the pre-construction issues and challenges?

5. What where were the challenges in the stakeholder management?

Coordinating with the stakeholders was definitely a troubling part, specifically in the later stages as the road construction became more and more complex. The lack of engagement and cooperation of many stakeholders were predominantly responsible for the poor productivity on construction sites. There were also issues of planning and scheduling with the stakeholders that further lead to the issues in collaboration and communication, this also resulted in the idle time that waste because of wait time for supplies and materials before the work needed to be completed.

6. What were the design related challenges you faced in your tenure?

There were two key challenges, one was the project going over the budget and second the time overruns. Moreover this impacted the capital infrastructure along with the volatile and rising costs that further impacted the productivity.

7. What were the challenges because of the laws and regulations?

We had challenges to deliver cost-effective Greenhouse Gas (GHG) emissions reductions. There was a lot of stress to be energy efficient. The aim was that in the long-term the project will enjoy from the operating costs and emission. However, throughout the project there was a lot of pressure from the law on sustainability and the cost also went up because of certain steel products and continual demand for resource-intensive supplies. However, the project was always up to date with Leadership in Energy and Environmental design, the process was very difficult to align with the project objectives.

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8. What were the challenges you faced because of evolution of knowledge and technology?

Overall, the construction industry is significantly slow to adopt new technologies, and it's a general tendency to underinvest in technology by this industry, even though we are aware that technology has a great potential to manage the construction projects far more efficiently. However, the project did implement mobile devices, telematics, BIM and a broad range of software application were used in the project management. Moreover, there were technologies like robots, drones, Internet of Things that were adapted for the project.

9. What were the challenges you faced because of contractors and suppliers?

There were a lot of idle time because of inadequate or late shipments, there were issues because of breaking down of the construction vehicles, inclement weather, complications in the design process that came in the mid-way of the contractor plans. Moreover, there frictions between the stakeholders and the contractors. These issues also impact the productivity and poor quality, further impacting profitability and rising costs

10. What were the cost escalations and quality issues?

There were trade conflicts, issues with tariffs, inflations and the rising cost of the construction materials, with the main construction cost increase between 2017 and 2018, seen cost rise in pipes, beams, plates, iron and steel.

APPENDIX 8: INTERVIEW TRANSCRIPTION FOR RESPONDENT 5

1. What is your position?

2. What was the tenure you worked?

3. Which team did you work for?

4. What were the pre-construction issues and challenges?

The challenges that came in the way in the pre-construction stage consisted of the capital requirements and this was underestimated on the requirement of funding during the different

stages of project management and the issues became visible in the progress payment stages. It was imperative to realize that working capital is imperative for the success of the road construction project and it was imperative to have the right cash flow because of which we made some bad decisions, we started undercapitalized and however did recover from the spiral in the process.

5. What where were the challenges in the stakeholder management?

There was lack of engagement and participation on part of the stakeholders and there were times we would lose sight of our capabilities and vision. It was challenging to keep in pace with the demands and we continue to expand and reach out for more and more capital resources. We lacked planning for the foreseeable growth and also did not had an adequate tracking system.

6. What were the design related challenges you faced in your tenure?

There was lack of comprehensive planning regarding the designs, along with the other aspects. This resulted in lack of a clear perspective of manpower, design and cash and we either overestimated or underestimated the capabilities.

7. What were the challenges because of the laws and regulations?

8. What were the challenges you faced because of evolution of knowledge and technology?

Even though we tried to keep in pace with technology, we were unable to keep with the risk extinction and that impacted the day-to-day operations, even though we kept in pace with the cloud based software, mobile technology and IoT.

9. What were the challenges you faced because of contractors and suppliers?

One of the issues was poor safety training and the contractors tried to cut corners to maximize their profitability, they did not spend on safety training that put the put under the risk of litigation costs and increased insurance.

10. What were the cost escalations and quality issues?

There were cost changes because of changes in the fixed price contracts. Also the cost of raw materials changed rapidly, we were affected at different stages because of changes in prices, and cost variations, between the time the project started and ended.