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ABSTRACT

The objective of this study is to determine the effect of project management process and technological orientation on infrastructure performance of the United Arab Emirates (UAE) Road and Transport Authority based on the Resource-Based View. Quantitative research was conducted to answer four research questions and four hypotheses. A self-administered questionnaire was used to collect data about project management process, technological orientation and infrastructure performance among 361 employees of UAE Road and Transport Authority. The sample was selected using convenience sampling. The data which was analysed using the structural equation modelling indicated a significant direct effect of project management process on technological orientation ($\beta = 0.313$, $t = 6.686$, $p \leq .05$), a significant direct effect of project management process on infrastructure performance ($\beta = 0.331$, $t = 6.431$, $p \leq .05$) and a significant direct effect of technological orientation on infrastructure performance ($\beta = 0.411$, $t = 7.346$, $p \leq .05$). This study also found a significant partial mediating effect of technological orientation on the relationship between project management process and infrastructure performance. In conclusion, project management process and technological orientation could improve infrastructure performance of UAE Road and Transport Authority. The implication of this study suggested that firms could improve infrastructure performance by implementing a systematic project management process that incorporates technological tools.

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KESAN MEDIASI ORIENTASI TEKNOLOGI TERHADAP HUBUNGAN ANTARA PROSES PENGURUSAN PROJEK DAN PRESTASI INFRASTRUKTUR PIHAK BERKUASA JALAN RAYA DAN PENGANGKUTAN DI EAB

ABSTRAK

Objektif kajian ini adalah untuk menyiasat hubungan antara proses pengurusan projek, orientasi teknologi dan prestasi infrastruktur di Emiriah Arab Bersatu (EAB) berdasarkan teori Model Penerimaan Teknologi. Reka bentuk penyelidikan kuantitatif telah dipilih untuk menjawab empat soalan penyelidikan dan empat hipotesis. Soal selidik yang ditadbir sendiri digunakan untuk mengutip data tentang proses pengurusan projek, orientasi teknologi dan prestasi infrastruktur dalam kalangan 361 pekerja Pihak Berkuasa Jalan Raya dan Infrastruktur EAB. Sampel telah dipilih dengan menggunakan persampelan mudah. Data yang dianalisis menggunakan pemodelan persamaan berstruktur menunjukkan hubungan yang signifikan antara proses pengurusan projek dan orientasi teknologi ($\beta = 0.313$, $t = 6.686$, $p \leq .05$), proses pengurusan projek dan prestasi infrastruktur ($\beta = 0.331, t = 6.431, p \leq .05$) dan orientasi teknologi dan prestasi infrastruktur ($\beta = 0.411$, $t = 7.346$, $p \leq .05$). Kajian ini juga mendapati orientasi teknologi menunjukkan kesan mediasi separa yang signifikan dalam hubungan antara proses pengurusan projek dan prestasi infrastruktur. Implikasi kajian ini mencadangkan bahawa firma boleh meningkatkan prestasi infrastruktur melalui pelaksanaan proses pengurusan projek dan penggabungan alat teknologi.

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LIST OF ABBREVIATIONS

GDP	Gross Domestic Product
RTA	Road and Transportation Authority
RTI	Road and Transport Institute
UAE	United Arab Emirates

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CHAPTER 1

INTRODUCTION

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1.1 Introduction

The Road and Transport Authority (RTA) is the agency in charge of licensing all public and commercial vehicles, as well as regulating and monitoring public transportation. From conception to completion, road and transportation infrastructure projects can take a very long time (RTA, 2017). Transport and infrastructure are seen as very important in the world economy and contribute significantly to the production, employment rate and performance of gross domestic products (GDP). Transportation is a major source of economic growth in both developed and developing countries. Consequently, transportation is viewed as a key component of the economy. There has been a substantial growth in the number of large infrastructure projects in several developing countries during the past few decades. Project management deals with the potential for

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project-related uncertainty. The root cause of project delays and decreased organizational performance is uncertainty (Aziz, Qasim, & Wajdi, 2017).

The critical contribution of the Road and Transportation Project Management Cycle on a global scale and promotes more development initiatives to assist the region of the Middle East and the United Arab Emirates (UAE) roads and transport. Increasingly, in globalization, internal and external pressures are restricting their opportunities and development. The competition includes unpredictable political and economic environment which potentially intensifies the challenges of project management processes in the United Arab Emirates (UAE) entering the global market. RTA is the sole provider of public transportation in Dubai, including the Dubai Metro, Dubai Tram, Abras, Dubai Bus, Dubai Water Bus, Water Taxi, and Dubai Ferry, as well as Dubai Taxi and its authorized taxi companies. Literature reviews regarding the planning periods of transport infrastructure projects in UAE have shown that the planning phase can take up to 10 years in the worst case (RTA, 2017).

The PMBOK Guide defines project management as the application of knowledge, expertise, tools, and procedures to a wide range of activities in order to achieve the requirements of a specific project (Ahmad, Connolly, & Demirag, 2021). In today's business world, project management is one of the fastest-growing fields (Amoatey & Ankrah, 2017) and it is an essential part of the construction process (Suryani, Hendrawan, Adipraja, Wibisono, & Dewi, 2021). Project management as a profession and field of study is expanding and developing. The demands on project management are changing as a result of project management being used in new industries, countries, and application areas (Sutrisna & Goulding, 2019). Project

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management can be used to improve a project's performance (X. Zhang & Schramm, 2020). Empirical evidence suggests that practising project management process can improve project performance. The hunt for elements that lead to better project performance and success has taken many years of research. Factors that affect a project's success have been extensively studied in the project management literature (Dang et al., 2017).

Technology is essential to project management, making it possible. With a firm foundation for automating solutions, information technology focuses on knowledge production, application, dissemination and sharing. Using a management tool that facilitates technology knowledge improves knowledge development, codification, and transfer. Hardware, software and databases, collaborative tools, and intelligent gadgets are all examples of technological tools (Butt & Ali, 2020).

Although transportation is a vital engine for economic growth, overruns of time and expense jeopardise the sector's ability to help accomplish the necessary expansion and ensure appropriate capital spending. New technologies are sometimes sluggish to take hold in the construction business, compared to other industries. An industry-wide survey by the Civil Engineering Research Foundation revealed only a 0.5 percent investment in research and development (R&D) by the design and construction sector (Ewedairo, Chhetri, & Jie, 2018). An optimal project management method is a significant financial decision option in every organization (Babatunde & Perera, 2017). Choosing project management is important not only for extending return to shareholders, but it is essential in view of the effect this option has on the capacity of an organization to handle concentrated participation. Therefore, project management,

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technical orientation, and organisational performance in the United Arab Emirates' infrastructure sector are examined in this research.

1.2 Background of The Study

The UAE government has outlined its long-term planning for infrastructural development in the UAE Vision 2021 and UAE Vision 2040. These visions emphasize the development of world-class infrastructure to support economic diversification, sustainable growth, and improved quality of life for residents. The government aims to position the UAE as a global hub for business, tourism, and innovation, with a focus on sectors such as transportation, energy, healthcare, and smart cities (Ministry of Cabinet Affairs, 2021).

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The infrastructural development plans in the long-term planning include various sectors. These encompass the construction of modern airports, seaports, roads, highways, bridges, public transportation systems, utilities, telecommunications networks, and sustainable urban development projects. The goal is to enhance connectivity, accessibility, and efficiency across the country, supporting economic growth, tourism, and overall quality of life (Ministry of Economy, 2021).

Construction companies are expected to play a vital role in achieving the long-term infrastructural development goals. They are entrusted with executing and delivering the planned projects in adherence to the highest standards of quality, safety, and sustainability. Construction companies are responsible for efficient project

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management, timely completion, effective resource allocation, and cost control. Collaboration with government entities such as the UAE Road and Transport Authority (RTA) is crucial to ensure alignment with the long-term planning and successful project outcomes (Ministry of Economy, 2021).

The project management process for infrastructural development typically consists of several phases. These phases include project initiation, project planning, project execution, project monitoring and control, and project closure. In the initiation phase, the project objectives, scope, and stakeholders are identified. During the planning phase, detailed plans, budgets, and schedules are established. The execution phase involves the actual construction and implementation of the project. Monitoring and control phases ensure progress tracking, quality assurance, and timely decision-making. Finally, the closure phase involves project handover, evaluation, and lessons learned (Project Management Institute, 2022).

In the UAE construction industry, various project management processes are performed by organizations such as the RTA. RTA was established by decree number 17 in 2005. RTA is responsible for planning and providing transportation, roads, and traffic requirements in the Emirate of Dubai, as well as between Dubai and other Emirates of the UAE and neighbouring countries, in order to provide an effective and integrated transportation system capable of achieving Dubai's vision and serving the Emirate's vital interests. RTA obtains funding from a variety of sources, including the private sector. From 2006 until 2018, the Dubai government's infrastructure investments totalled AED100 billion.

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The project management process performed by the RTA include traditional project management methodologies. Project management process entails the execution of regular duties that comprise the stages of project management: Initiating and Planning; Executing, Monitoring and Controlling; and Closing (Project Management Institute, 2018). Project Implementation requires actions to be completed under conflicting constraints of time, cost, scope, quality, risks, and resources (Takim & Akintoye, 2002). However, research indicates that project management process does not adhere to budget and schedule limits, nor do they match consumer expectations and corporate goals (Agyekum, Botchway, Adinyira, & Opoku, 2022). With the adoption of technology-driven approaches such as Building Information Modeling (BIM) and Integrated Project Delivery (IPD), it is also now important to investigate how leveraging advanced technological orientation in the project management processes within the construction industry, specifically in the context of the RTA would improve the infrastructure performance (Al Shamsi, 2019).

1.3 Problem Statement

In the context of the Road and Transport Authority (RTA) in the UAE, several problems related to infrastructure performance have been observed. UAE's infrastructure project failure rate has been estimated to be as high as 50% (Arshed, Sardar, & Iqbal, 2022). Due to the high failure rate of infrastructure projects in the country, an extremely competitive claims dispute business has developed (Deb, Nafi, Mallik, & Valeri, 2023; Ibrahim, Thorpe, & Mahmood, 2019; Khan, Yu, Umar, Lopes de Sousa Jabbour, & Mor, 2022). Previous research revealed that 50% of the construction projects in UAE are

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delayed and are not completed on time (Shameem P, Chittedi, & Villanthenkodath, 2023). Moreover, Al Shamsi (2019) found that half of all construction projects in the country experience delays. According to Arshed, Sardar, & Iqbal (2019), the number of construction projects that experienced delays grew by approximately one-fifth between 2005 and 2009.

Looking seriously into this matter, this study hypothesized several factors causing the poor infrastructure performance. Firstly, there is a lack of systematic project management process employed by the RTA, either in the initiating, planning, executing, monitoring and controlling, or closing, that affects the infrastructure performance. This statement is proven by past studies that investigate the causes of construction delays in UAE. It was found that the top 10 most significant causes of construction delays were related to the lack of systematic project management process (Waheed, Hussin, & Bin Megat Daud, 2018). For example, the approval of drawings, inadequate early planning and slowness of the owners' decision-making process are the top causes of delay in the UAE construction industry. Slowness in the owner's decision-making process is followed by shortage of manpower, poor supervision, and poor site management, productivity of manpower, skill of manpower, non-availability of materials on time, obtaining permit/approval from the municipality/different government authorities, and contractor financing during construction. Previous studies (Ewedairo et al., 2018; Gharehgozli, de Vries, & Decrauw, 2019; Mahmud, Ogunlana, & Hong, 2021) lent further support as they found that productivity, skill, and a lack of manpower and proper communication was one of the major causes of delays. Overall, the poor project management process led to delays, cost overruns, and suboptimal quality in infrastructure projects (Sami Ur Rehman, Shafiq, & Afzal, 2022). Therefore, it is

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rational to accept that project management process has a positive significant effect on infrastructure performance (Taleb, 2020; Abdulla Al Marzooqi & Zamberi Ahmad, 2018; Zamberi Ahmad & Ahmad, 2016).

Secondly, despite advancements in technology, the RTA's utilization of technological tools and systems in project management appears to be limited, potentially hindering the overall infrastructure performance (Taleb, 2020). These symptoms indicate the need to explore the relationship between the project management process, technological orientation, and infrastructure performance within the context of the RTA in the UAE.

There is also limited understanding of the mediating role of technological orientation in the relationship between project management process and infrastructure performance. While project management processes play a crucial role in delivering successful infrastructure projects, the extent to which technological orientation mediates this relationship remains underexplored (Al Shamsi, 2019). Additionally, the potential benefits of adopting and integrating technological tools and systems into project management processes have not been thoroughly investigated within the context of the RTA in the UAE (Waheed et al., 2018).

Hence, it is crucial to address this gap in the existing literature to enhance the understanding of how technological orientation affects the relationship between project management process and infrastructure performance within the RTA. Accordingly, the main research objective of this study is to examine the mediating effect of technological orientation on the relationship between project management process and infrastructure

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performance within the UAE RTA. By investigating this relationship, the study aims to provide valuable insights and recommendations for improving infrastructure performance through effective project management processes and the integration of technology within the RTA.

1.4 Research Objectives

The study's overarching purpose is to determine the relationship between the project management process, technological orientation, and infrastructure performance in the UAE. However, there are some specific objectives of this study that will be addressed as following:

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1. To determine the direct effect of project management process on technological orientation.
2. To determine the direct effect of project management process on infrastructure performance.
3. To determine the direct effect of technological orientation on infrastructure performance.
4. To investigate the indirect effect of technological orientation on the relationship between project management process and infrastructure performance.

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1.5 Research Questions

The study's primary question of the study is to determine the link between the project management process, technological orientation, and organizational performance in the UAE. Nevertheless, there are some specific questions which are:

1. Does project management process have a significant direct effect on technological orientation?
2. Does project management process have a significant direct effect on infrastructure performance?
3. Does technological orientation have a significant direct effect on infrastructure performance?
4. Does technological orientation have a significant indirect effect on the relationship between project management process and infrastructure performance?

1.6 Research Hypotheses

H1: There is a significant direct effect of project management process on technological orientation.

H2: There is a significant direct effect of project management process on infrastructure performance.

H3: There is a significant direct effect of technological orientation on infrastructure performance.

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H4: There is a significant indirect effect of technological orientation on the relationship between project management process and infrastructure performance.

1.7 Conceptual Framework

A conceptual framework is defined as a network or a plane of interlinked concepts that is put together to provide a comprehensive understanding of a phenomenon in which these concepts constitute a conceptual framework (Shameem P et al., 2023; Wong & Yip, 2019)The conceptual framework that is shown in Figure 1.1 depicts the relationship between the variables used in this study. Based on established relationship found by previous scholars, conceptual framework is developed.

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In a conceptual framework, the researcher's posited study variables are shown in a diagram according to their researchers' apparent flow of relationship. The conceptual framework is derived from the research theoretical framework and the literature review on the subject matter under study. An explanation of the linkages and relationships that shows the hypothesis proposed to be true for readers' comprehension without requiring them to read the entire document. A conceptual framework summarizes the relationships between the study's variables.

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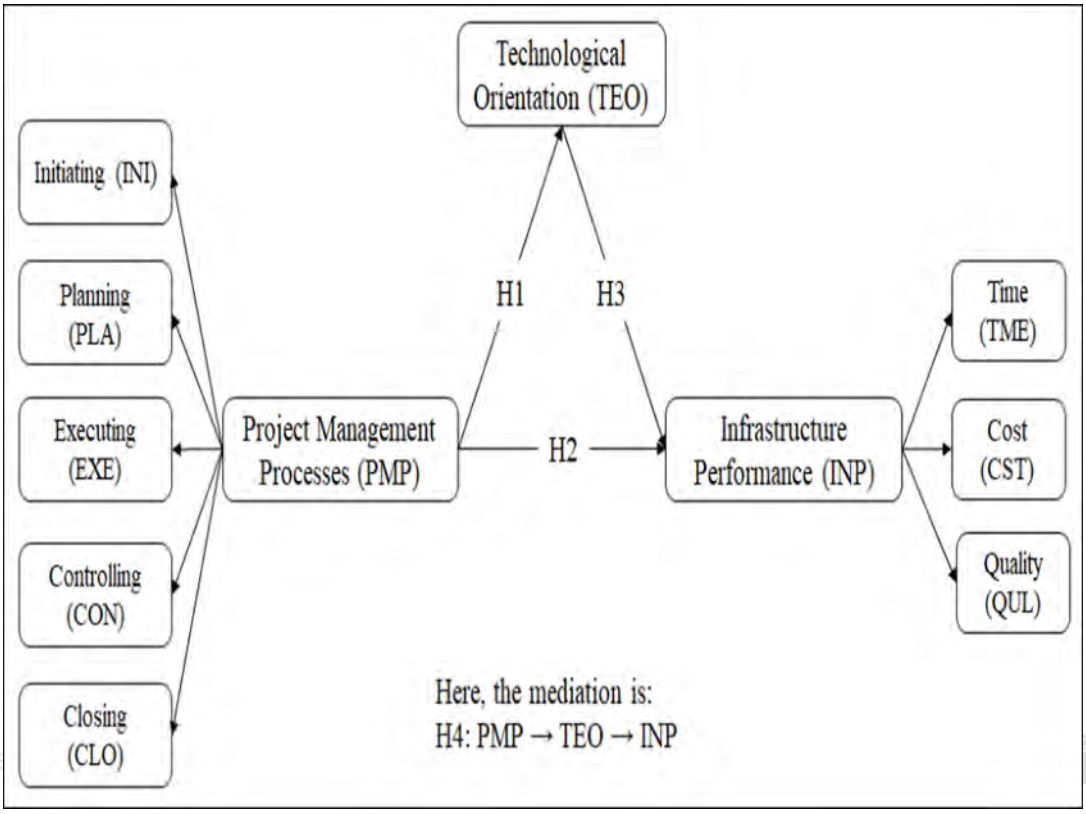
Figure 1.1

Conceptual Framework



As shown above in the Figure 1.1 the independent variable is project management process which comprised of five dimensions (initiating, planning, executing, controlling, and closing). The mediating factor is the technological orientation. However, the receiving subject is the dependent variable, and it is predicted that any change in the other variables will have an impact on or modify the recipient. Based on Figure 1.1, infrastructure performance is the dependent variable of this study which consists of three dimensions (time, cost and quality). In this study there are four hypotheses to be tested.

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1.8 Significance of the Study

Road and transportation are an important component of the country's economy and are the way forward in UAE (Qaffas, Ilmudeen, Almazmomi, & Alharbi, 2023). Road and transportation contribute heavily towards the national economy in developed countries. This current work will, therefore, be of benefit to the RTA in the UAE.

The findings of this study expand the existing literature on infrastructure performance by verifying the mediating effect of technological orientation in the relationship between project management process and infrastructure performance. Practitioners and academics alike will benefit from this research. Previous studies have ignored to study the effect of project management process and technological orientation on infrastructure performance. As a support for construction agencies and as a contribution to academic knowledge, the implications also serve as a useful tool. Research like this must be conducted by academics in order to establish connections that benefit project management in general.

Furthermore, this study confirmed that Resource-Based View Theory could explain the relationship between project management process, technological orientation and infrastructure performance. Thus, academics should take steps to establish connections that will be helpful to the road and transport projects' overall management.

Organizations should allocate higher investment on developing better project management process as it has direct positive effect on infrastructure performance. The research made a methodological contribution in terms of research methodology that is

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the descriptive method of research, which was employed in this study while predominantly relying on the quantitative methods.

This study has provided empirical evidence that Resource-Based View Theory could explain the relationship between project management process, technological orientation and infrastructure performance. It thus, contributes to the body of literature by providing evidence of mediating effect of technological orientation on the relationship between project management process and infrastructure performance.

The study results recommend managers to focus on improving technological orientation in their organization in order to increase infrastructure performance. The study's findings will provide critical insights that will assist the numerous stakeholders involved and the overall success of massive transportation projects in the UAE. Practitioners should not rely solely on specific project management techniques, but also on all aspects of project management process and technological orientation for optimum infrastructure performance.

1.9 Scope and Limitations

The study's limitations are confined to the reasons of practicality and the amount of time and resources at the disposal of this researcher. Due to above, the scope of the research is limited to following specific variables and factors hence, the other factors that impacts on the infrastructure performance will not be studied. The study is exploring the various sampling methods and selecting the most appropriate method to

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suit the requirements. By performing probability sampling, there is always a chance that not all groups in the population will be represented in the sample. Infrastructure will be selected to cover all the states within the UAE and a selection of RTA was based on a set of pre-determined criteria.

The research scope in terms of research methodology will be the descriptive method of research, which will be employed while predominantly relying on the quantitative methods but without completely ruling out the qualitative input. The next step will focus on the research strategy to be implemented. For the research scope, the research framework will be defined to capture the essence of the study. Data collection techniques will also be considered to achieve an optimum outcome.

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The RTA definition will be based on the Department of Census and Statistics. Although there are other definitions available and due to the challenges with the said definitions of the infrastructure, for this research, the researcher used the above definition to improve the link between project management and organizational performance for the United Arab Emirates' infrastructure sector, however, project management process and organizational performance have been highlighted as the variables within the scope. However, several dimensions under each variable will also be measured accordingly, like time, cost and quality for infrastructure performance. This study will assist the stakeholders and government agencies of UAE to develop policies and legislation, adopt new technologies, innovative practises and world-class standards to help shape the future of Dubai infrastructure in terms of roads and transportation.

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1.10 Operational Definition

Project Management Process

Project management method is an administration process for the design and management of the services or the implementation of a project (Saqib, Udin, & Zarine, 2018). In this study, the researcher defines a project management life cycle to consist of 5 distinct phases including initiation, planning, execution, controlling and closing that combine to turn a project idea into a working product (Project Management Institute, 2017).

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Initiation

Project initiation is the first phase of a project's life cycle. It is at this point where the opportunity or reason for the project is identified and a project is developed to take advantage of that opportunity (Albrecht, 2017). In this study, initiation involves defining project constraints, goals, appointment of the project manager, budget, expected timeline and identifying key project stakeholders.

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Planning

Project planning is a skill for stating how to complete a project within a certain timeframe, usually with defined stages, and with designated resources (Albrecht, 2017). In this study, the planning phase include the primary tasks such as identifying technical requirements, developing a detailed project schedule, creating a communication plan, and setting goals/deliverables for this phase.

Execution

The researcher defines project execution as when project planning is put into action and tasks and deliverables are monitored to ensure the project succeeds (Albrecht, 2017).

Control

The researcher defines controlling as having a means of measurement and initiating adjustments in the course of an activity to address unwanted changes to cost, schedule, quality, or risk elements that have influenced the activity (Albrecht, 2017).

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Closing

In this study closing is defined as formal recognition of the completion of a project—everyone agrees that it is completed (Albrecht, 2017).

Technological Orientation

In this study, technology orientation is defined by the degree of commitment to R&D, acquisition of new technologies and applications of the latest technology (Qaffas et al., 2023).

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Infrastructure

In this research, infrastructure includes the basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise.

Infrastructure Performance

Infrastructure performance is the degree to which infrastructure provides the services that the community expects of that infrastructure (Narayanaswami, 2017). The performance of infrastructure is measured using schedule, cost, and quality metrics also

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known as the “iron triangle” (Takim & Akintoye, 2002). Thus, in this study it is measured in terms of time delays, cost overruns and quality of outcome.

Road and Transportation Authority (RTA)

RTA is responsible for planning and providing transportation, roads, and traffic requirements in the Emirate of Dubai, as well as between Dubai and other Emirates of the UAE and neighbouring countries, in order to provide an effective and integrated transportation system capable of achieving Dubai's vision and serving the Emirate's vital interests.

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1.11 Organization of the Study

The entire study is segregated with several chapters. Each and every chapter has the different role for executing the research properly. Those chapters and their explanations are presented briefly as below.

In the first chapter, we learn about the study's history, problem statement, research questions, research aims, importance, scope, methodology, and study limits. The chapter concludes with a summary and conclusion.

The second chapter is a comprehensive overview of the existing research on road and transportation in the United Arab Emirates. It begins with the overview of

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defining micro enterprises, small enterprises and medium enterprises with their development to provide a basic understanding. Then this chapter reviews the empirical and theoretical literature to create the bridge for the research framework.

Chapter three focuses on the identification and discussion of the methodology used in this study covers the introduction and overview, followed by the design of the research process, research strategy and justification of using quantitative methodology, selection of sampling, method of data collection, pilot study, data analysis methods and the validity of the variables tested by the study, ethical considerations followed by the chapter's summary.

The fourth contains the analysis of the data, tests, procedures and the findings of the research. It also includes results of the validity, reliability of the data together with various statistical analysis tools to understand and interpret findings during data collection stage and presentation of findings derived from the statistical analysis together with the chapter's summary and conclusion.

Subsequent to an introduction to the chapter followed by the chapter's overview, chapter five provides the conclusions of the data analysis which are backed up by hypotheses testing. Findings of the research are discussed in detail in this chapter. It also covers the theoretical contributions of the research and practical contributions of the research to the business decision makers, stakeholders of the infrastructure including government policy makers. This chapter also contains the implications and recommendations for future studies followed by the chapter's summary and conclusion.

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1.12 Summary

The first chapter serves as an introduction to the research and lays the groundwork for the study's overall framework. Few sections make up the chapter's structure. An overview of the historical context, significance, and contribution of infrastructure to the national economy opens this study. Next, it examines the current state of project management in United Arab Emirates for this type of infrastructure. (UAE). The objectives of this study seek to answers and address research questions are also outlined. The significance and contribution of this study tend to improve the project management competency is presented. In the context of Infrastructure in the United Arab Emirates (UAE), the scope of study focuses on the significant effect in managing and leveraging debt and equity financing. Finally, an outline of the study's organisation briefly covers each chapter and its structure. The concluding section provides an overview and a summary of the first chapter.

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