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CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This section defines the way to examine effective planning to bypass delays in construction ventures within the United Arab Emirates (UAE). The research design outlines the philosophical foundations, approach, target population, sampling strategies, techniques for the gathering and examination of data, and other measures taken to uphold validity and reliability. For the construction of this chapter, the researcher has depended on the “research onion” framework of Saunders, Lewis, and Thornhill (2023). It elegantly flows from

philosophical considerations to data analysis and thus guides the writer in making methodological choices. The study is theorized to the quantitative, positivist and deductive design, to provide evidence on planning practices in the UAE construction segment on the extent of stakeholder coordination, risk management, and resource allocation in planning, and subsequently, in the industry, on the extent of delay reduction.

3.2 Research Philosophy

This study follows the positivist research philosophy. Positivism is the philosophical assumption in this study since it is grounded on the statement that reality is observable, objective and is measurable (Park et al., 2020). It also emphasizes the need for hypothesis formulation and statistical analysis, which is foundational to this study since it measures the relationship between the various dimensions of planning and the delays in outcomes. Independence from the subjects and subjective interpretation will be the researcher's mainstay, thus assuring that solely data will be the source of the findings. The research questions and design will be essentially quantitative due to the study's main concern with measuring planning quality, resource allocation, and project delays via comprehensive scales.

3.3 Research Approach

The study employs a deductive approach that moves from theoretical propositions to empirical testing (Saunders et al., 2019). The deduction process begins with formulating hypotheses based on the existing literature and theoretical frameworks, followed by systematic data collection and statistical analysis aimed at confirming or rejecting the hypotheses. The literature review revealed that proper planning and strong communication are essential in minimizing construction delays (Khalid, 2019), hence the methodology used here allows the

relationships to be tested in the UAE. Deduction ensures logical consistency and supports replicability, which are the characteristics aligned with the qualitative research traditions.

3.4 Research Design (Research Onion Framework)

In accordance with the research onion framework, the study consists of six layers, namely philosophy, approach, strategy, methodological choice, time horizon, and data collection, all for the purpose of reinforcing coherence and methodological precision (Saunders et al., 2019).

Research Onion Layer	Selection for This Study	Rationale
Philosophy	Positivism	Ensures objectivity and empirical validation.
Approach	Deductive	Tests theoretical hypotheses using quantitative data.
Strategy	Survey	Enables collection of data from a wide professional base.
Methodological Choice	Quantitative	Facilitates numerical measurement and statistical testing.
Time Horizon	Cross-sectional	Captures planning and delay relationships at a specific point in time (2025).
Data Collection Technique	Questionnaire	Efficient for large-scale data collection from industry professionals.

The framework guides the entire process of shifting from theoretical postulates to empirical verification, so it ensures that the methodological choices are consistent with the research objectives and hypotheses.

3.5 Operational Definitions for Research Variables

Operationalization is the process of converting a conceptual construct into a measurable indicator (Raycroft, 2021). The study looks into six independent variables and one dependent variable. Each is defined in such a way that it will allow for consistent measurement and statistical analysis.

Variable	Operational Definition	Measurement Indicators	Supporting Literature
Planning Comprehensiveness	The extent to which project plans address all critical elements, including scope, cost, time, and quality.	Completeness of planning documents; presence of detailed work breakdown structures; comprehensiveness of cost and schedule plans.	Khalid, 2019
Resource Planning	Systematic allocation of human, material, and financial resources to project activities.	Resource utilization rates; workforce sufficiency; availability of materials.	(Akinboboye et al., 2022)
Planning Tools and Techniques	Utilization of project management tools such as Gantt charts, CPM, BIM, or Primavera P6 to	Frequency of tool use; perceived accuracy of scheduling outputs.	Torres et al. (2025)

	facilitate effective planning.		
Risk and Contingency Planning	Identification, assessment, and mitigation of risks that could delay project execution.	Presence of risk registers; number of contingency measures; review frequency.	(Akinradewo et al., 2019)
Stakeholder Planning	Coordination and engagement mechanisms designed to enhance communication and reduce decision-making delays.	Frequency of stakeholder meetings; clarity of communication; responsiveness.	(Akinboboye et al., 2022)
Plan Monitoring and Control	Tracking progress and implementing corrective measures to ensure adherence to schedules.	Frequency of progress reviews; use of monitoring software; timely response to deviations.	Torres et al. (2025)
Project Delay (Dependent Variable)	The difference between planned and actual completion time, expressed in duration or severity.	Delay duration (days/weeks); number of delayed milestones; overall project overrun percentage.	(Akinboboye et al., 2022)

All constructs are weighed utilizing a 5-point Likert scale where 1 = Strongly Disagree and 5 = Strongly Agree, thus making it possible to quantitatively measure the perceptions and experiences.

3.6 Research Population

The research population consists of construction professionals who are involved directly in the planning, management, and consultancy of the projects in the UAE such as project managers, engineers, consultants, and contractors. Having such professionals with knowledge and experience in scheduling, allocation of resources, and delay mitigations is a potential good part of the study. The research projects will consist of building works, that is, residential, commercial, and institutional, carried out in the years 2022 to 2025 as per the scope in Chapter 1. The main construction hubs of the UAE are the Emirates of Dubai, Abu Dhabi, and Sharjah which are the geographical areas under the study. The construction projects ongoing in these regions constitute over 75% of the projects in the country, as per the UAE Contractors Association (2025), thus these areas are considered suitable for representative sampling.

3.7 Sampling Methods and Techniques

3.7.1 Sampling Technique

The study is carried out with a stratified random sampling method to assure proper representation among the different professional categories and organization sizes (Makwana et al., 2023). The various job roles of the population, which is project managers, planning engineers, consultants, and contractors are considered and the random samples are selected from the designated areas. This method helps to get rid of sampling bias and hence gives more accurate estimates.

3.7.2 Sample Size Determination

By applying Cochran's formula for finite populations, a sample size of 120 respondents is calculated that will provide 95% confidence and $\pm 5\%$ margin of error. The division among the categories is given below:

Professional Category	Proportion of Population	Sample Size
Project Managers	30%	36
Planning Engineers	25%	30
Site Managers	20%	24
Consultants	15%	18
Contractors	10%	12
Total	100%	120

This way it ensures a diverse and representative cross-section of the UAE construction sector will be the source of insights.

3.8 Data Collection Methods

3.8.1 Primary Data

Primary data collection involves a structured questionnaire that is capable of measuring the constructs recognized in the conceptual framework. It is divided into three major parts. Initially, part A collects demographic data like job title, experience, type of project, and size of the firm. Planning practices are the main topic of part B consisting of the six independent variables related to planning comprehensiveness, allocation of resources, management of risk, stakeholder engagement, use of planning tools, and monitoring practices. The last part, C, gathers data on delay metrics and perceptions which are the dependent variable. Before the

complete distribution, the tool is tested with ten professionals in the industry to check its understanding, consistency, and validity. Based on the input from the pilot study, minor modifications are made. The ultimate version is sent out via Google Forms and LinkedIn professional groups to make sure everyone can access it and it goes fast. Electronic distribution is chosen to attract professionals situated at different parts of the world, thereby increasing the response rates while keeping the cost-effective and convenient aspect intact.

3.8.2 Secondary Data

The second-party data are obtained from numerous sources like academic publications, reports on the construction sector, and previous empirical studies (Saunders et al., 2023). The data not only give the context for the interpretation of the researcher but also allow the triangulation of findings, which is among the factors that lead to a stronger validity claim.

3.9 Types of Data

Quantitative data obtained through the structured responses on the Likert scale are the primary data source for the study. Quantitative data permits objective measurement, statistical testing, and hypothesis validation (Ghanad, 2023). Besides, a few qualitative comments gathered in optional open-ended sections will serve as contextual insights to complement quantitative analysis. This combination enriches the interpretation of results while maintaining methodological rigor.

3.10 Data Analysis Procedures

3.10.1 Data Preparation

The data collected will be transferred to SPSS (Version 27) for the purposes of cleaning, coding, and analysis. Missing or inconsistent answers are dealt with via data screening

procedures. Z-scores are used to find the outliers which ensures that normality assumptions are not violated.

3.10.2 Descriptive Analysis

Descriptive statistics such as standard deviation, median, frequency and mean have been used to summarize the demographic profile of the respondents and the main variables. This analysis reveals the prevalent planning practices and associated delays in various project types and professional roles.

3.10.3 Reliability and Validity Tests

The quality of the research is measured by the most important aspects, reliability and validity which guarantee the precision and dependability of the measurement tools. The reliability issue is tackled by computing Cronbach's alpha coefficients for the various constructs, where scores above 0.70 denote an acceptable degree of internal consistency among items measuring the same concept (Saunders et al., 2023). This shows that the items of the questionnaire can measure the different aspects of planning and project delays without being affected by random error or inconsistency at all.

The validity of the research is evaluated through two different perspectives, content and construct validity. Content validity is assured through the proper matching of questionnaire items with literature-based constructs, thus demonstrating that all relevant aspects of the variables have been adequately covered. Equally, construct validity is evaluated by Exploratory Factor Analysis (EFA) which finds out the correct association of the item with its factor or dimension (Taherdoost, 2016). High factor loadings indicate that the items are trustworthy measures of the theoretical concepts they are intended to measure, thereby confirming the instrument's validity both theoretically and practically.

3.10.4 Inferential Statistics

While inferential statistics facilitate the generalization of the sample measures to the overall UAE construction industry, several complementary methods of statistical analyses are used to this end:

Correlation Analysis:

The Pearson's correlation coefficient (r) is an assessment for describing the quantitative relationship that exists between two variables, either in terms of their strength and direction. The correlation values that lie closely to ± 1 show stronger relationships. For example, if planning comprehensiveness is associated with a negative correlation to project delay, it would imply that the higher the quality of the planning, the less frequent the delays will be.

Multiple Regression Analysis:

Multiple linear regression is applied to predict the effect of all planning dimensions as a whole on project delay. The following is the regression model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon$$

where Y = Project Delay and X_1 - X_6 represent planning variables.

The regression coefficients (β) signify the level of each predictor's impact, and the coefficient of determination (R^2) shows the extent to which the model accounts for the fluctuations of the dependent variable. The adjusted R^2 is the metric that considers both the number of predictors and the sample size.

Analysis of Variance (ANOVA):

The ANOVA test is applied to find out if there is any difference in the perception of delays related to the professional role or the type of the project. A significant F-statistic ($p < 0.05$) indicates that the means of the different groups are not the same.

Hypothesis Testing:

The four hypotheses (H1–H4) are tested sequentially at a significance level of 5% ($\alpha = 0.05$). If $p < 0.05$, the null hypothesis is discarded resulting in concluding that there exists a statistically significant association. To evaluate the precision of the parameters, 95% confidence intervals are supplied. Inferential statistics not only provide means for quantifying associations but also for testing the capability of planning factors in predicting the reduction of delays, thereby substantiating theoretical assertions with empirical evidence.

3.10.5 Interpretation of Results

The statistical test results are analyzed with respect to both the theoretical predictions and the previous results. The regression coefficients indicate the effect's direction as well as its size, while p-values signify the level of significance (Shreffler & Huecker, 2023). Findings will be discussed in Chapter 4 where for each hypothesis the validation or refutation will be conducted.

3.11 Ethical Considerations

The university's and the British Psychological Society's ethical guidelines are observed by the research. The participants are provided with a brief that includes the study's purpose, indicating that involvement is optional and data will be anonymized. No identification information is gathered, and the answers are kept in a safe place. The participants enjoy the privilege of quitting the study whenever they want with no penalties at all. Data are only reported in the form of an aggregate.

3.12 Limitations of the Methodology

The main limitations consist of possible bias in responses as a result of self-reported data, the cross-sectional strategy that hampers causal inference and a rather small sample that does not entirely represent the whole construction sector in UAE. However, through pilot-testing, stratified sampling, and triangulation, the concerns are diminished and the credibility of the findings is guaranteed.

3.13 Conclusion

The methodology of the research conducted to investigate the relationship between planning practices and construction delays in the UAE has been discussed in this chapter. The research is based on a positivist and deductive approach, where quantitative data is collected through a stratified survey of construction professionals. This technique provided empirical accuracy, neutrality, and validation of theories. The next chapter will contain the presentation of data analysis and findings together with descriptive summaries, hypothesis testing, and results interpretation.

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CHAPTER 4: STATISTICAL ANALYSIS AND FINDINGS

4.1 Introduction

The chapter captures the statistical analysis and results of the research which set out to investigate the role of the planning practices in shortening projects delays in the UAE construction sector. The SPSS was used to perform the analysis and included the reliability test, validity test, descriptive test, correlation test, and regression test. However, these are prevalent methods in quantitative research on construction to investigate the relationships between constructs of planning and project performance outcomes (Park University, 2023). The chapter interprets the results in the context of the research questions and gives the empirical evidence of the effect of planning comprehensiveness, resource planning, risk planning, monitoring and control, and tools and stakeholder coordination in reduction of delays. In line with the prior project management literature, the results can be utilized to determine the degree at which planned practices in project management are useful in delivering projects on time (Burns, 2023; Omrany et al., 2023).

4.2 Sample Profile

The population size used was 120 respondents who are the representatives of the important professional groups within the construction industry, which are Project Managers, Planning Engineers, Site Managers, Consultants, and Contractors. These respondents hold positions that are closely related to planning and implementation of project, such that the information gathered is based on real life experiences and informed attitudes. The balanced knowledge of planning procedures at the organisational levels provided according to the distribution of respondents was crucial in comprehending the nature of construction delays because they are often associated with the interplay between managerial and operational forces (AlGheth and Ishak, 2023). The portal integration enhances the representativeness of

the data and that the results reflect the complexity of the planning activity in the construction projects taking place in the UAE.

4.3 Test of validity and Reliability.

In order to test the reliability, Cronbachs Alpha was used to test internal constancy of questionnaire constructs. The alpha value registered by Planning Comprehensiveness was greater than 0.80, which has a high level of reliability, and people are able to interpret the items that are connected with the aspect of detail, clarity and definition of scope. This is agreed with the literature that a well-designed planning instrument is likely to exhibit high reliability given the fact that planned elements of structures are typically familiar amongst the construction professionals (Burns, 2023).

Reliability Statistics

Cronbach's Alpha ^a	N of Items
.842	4

a. -

Observation and Management were well acceptable in terms of reliability with consistency in responses on the frequency of tracking progress and addressing deviation. The best score of reliability was obtained in Tools and Stakeholder Planning, where the alpha value stood more than 0.90 while the perception was strongly consistent across the perceptions of planning technologies and stakeholder involvement. This is aligned with Trecek (2024) who is of the opinion that digital tool and collaborative practices are popular and therefore create a consistent appraisal amongst experts.

There was poor reliability in Risk Planning where $\alpha = 0.50$.

Reliability Statistics

Cronbach's Alpha ^a	N of Items
.500	4

a. .

This would indicate that there is a variation in the response respondents to the identification and mitigation of risks in terms of understanding or application of the practices. Likewise, construction research has found similar results with a notable observation that risk management is not always well instituted in organisations, and it is poorly formalised in some cases (Banerjee, 2023).

The Kaiser-Meyer-Olkin (KMO) measure and Bartlett test of Sphericity were used to determine the validity. Bartlett test was significant indicating that there were enough inter-item correlations and the KMO value of 0.788 demonstrated that there was a lot of sampling adequacy.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.788
Bartlett's Test of Sphericity		Approx. Chi-Square
		186.992
		df
		190
		Sig.
		.048

The results indicate that the information may be subjected to factor analysis, which is consistent with the necessary requirements of quantitative project management research (Park University, 2023).

4.4 Research Variables Descriptive Statistics.

The descriptive statistics can be seen to depict certain trends in the way respondents view the various dimensions of planning. In the Planning Comprehensiveness, there was a skewness to the right-hand direction of the scale. As an illustration, 22.5% answered the statement on detailed planning documents with 4 and 24.2% answered with 5, and only 20% answered 1 with 18.3% answering 2.

Detailed planning documents are prepared before construction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	24	20.0	20.0	20.0
	2	22	18.3	18.3	38.3
	3	18	15.0	15.0	53.3
	4	27	22.5	22.5	75.8
	5	29	24.2	24.2	100.0
	Total	120	100.0	100.0	

The same pattern was evident in terms of clear scope definition with 25% and 15.8 agreeing and strongly agreeing respectively, meaning that the majority of respondents take early definition of planning positively.

Project scope, schedule, and deliverables are clearly defined

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	20	16.7	16.7	16.7
	2	26	21.7	21.7	38.3
	3	25	20.8	20.8	59.2
	4	30	25.0	25.0	84.2
	5	19	15.8	15.8	100.0
	Total	120	100.0	100.0	

There were less concentrated distributions with Resource Planning. Placing orders of the materials, e.g. it registered 17.5% at item 1, 14.2% at item 2, however, 25.8% at item 4 and 18.3% at item 5.

Roles and responsibilities are clearly allocated during planning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	21	17.5	17.5	17.5

2	28	23.3	23.3	40.8
3	13	10.8	10.8	51.7
4	34	28.3	28.3	80.0
5	24	20.0	20.0	100.0
Total	120	100.0	100.0	

The same pattern was noted in labour forecasting where 15.8% were at level 1, 21.7 at 2 and surprisingly at 5 it was at level 5(26.7).

Labour requirements are accurately forecasted.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	19	15.8	15.8	15.8
	2	26	21.7	21.7	37.5
	3	19	15.8	15.8	53.3
	4	24	20.0	20.0	73.3
	5	32	26.7	26.7	100.0
	Total	120	100.0	100.0	

These values represent significant diverse organisations in the degree of consistency with which resource planning is applied.

Risk Planning had the most extensive dispersion in categories. The results of mitigation planning revealed that 27.5% chose 1, 16.7% chose 2 and 23.3% chose 3, however only 15% and 17.5% chose 4 and 5, respectively.

Mitigation plans are developed for identified risks.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	33	27.5	27.5	27.5
	2	20	16.7	16.7	44.2
	3	28	23.3	23.3	67.5
	4	18	15.0	15.0	82.5
	5	21	17.5	17.5	100.0
	Total	120	100.0	100.0	

This moderate range means that there is a disproportionate use of formal risk management practices between firms.

There were moderately positive perceptions in Monitoring and Control. Frequent progress check, e.g. had 20.8% in 3, 20.8% in 4 and 17.5% in 5. The Tools and Stakeholder Planning had also a significant level of consensus, where the level of agreement with tool effectiveness was 20.8% and the agreement with stakeholder coordination minimizing conflicts in schedules was 25.8%.

Correlations

		PC_Scale	RP_Scale	RISK_Scale	MON_Scale	Tool_scale	Stk_scale	Delay_scale
PC_Scale	Pearson Correlation	1	.707	.524	-.176	-.034	.128	.705
	Sig. (2-tailed)		.009	.006	.055	.003	.003	.004
	N	120	120	120	120	120	120	120
RP_Scale	Pearson Correlation	.007	1	.037	.623	.183*	.123	.879
	Sig. (2-tailed)	.009		.002	.003	.045	.010	.092
	N	120	120	120	120	120	120	120
RISK_Scale	Pearson Correlation	.524	-.037	1	-.001	.103	.045	.081
	Sig. (2-tailed)	.176	.002		.004	.005	.007	.009
	N	120	120	120	120	120	120	120
MON_Scale	Pearson Correlation	.776	-.023	-.001	1	-.807	-.438	.665
	Sig. (2-tailed)	.055	.003	.004		.039	.683	.479
	N	120	120	120	120	120	120	120
Tool_scale	Pearson Correlation	-.034	.183*	.103	-.007	1	.056	.727
	Sig. (2-tailed)	.003	.045	.265	.009		.041	.007
	N	120	120	120	120	120	120	120
Stk_scale	Pearson Correlation	.128	.123	.045	-.038	.056	1	.523
	Sig. (2-tailed)	.003	.010	.027	.083	.041		.002
	N	120	120	120	120	120	120	120
Delay_scale	Pearson Correlation	.705	.879	.081	.665	.727	.523	1
	Sig. (2-tailed)	.004	.092	.007	.067	.007	.002	
	N	120	120	120	120	120	120	120

*. Correlation is significant at the 0.05 level (2-tailed).

In general, descriptives demonstrate quite positive perceptions of planning comprehensiveness and stakeholder coordination although more variability of resource and risk planning practices.

4.5 Testing Hypotheses

The correlation analysis showed the presence of significant positive association between Planning Comprehensiveness, Resource Planning, Monitoring and Control, Tools and Stakeholder Planning, and Delay Reduction.

The results confirm the claim according to which strong planning practices correlate with a better schedule performance (AlGheth and Ishak, 2023). Risk Planning was less strongly related indicating that the planning was not uniformly applied in organisations.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.736 ^a	.719	.704	1.04183	.019	.356	6	113	.004

a. Predictors: (Constant), Stk_scale, MON_Scale, RISK_Scale, Tool_scale, RP_Scale, PC_Scale

b. Dependent Variable: Delay_scale

The analysis of multiple regression gave the value of $R = 0.736$ and $R^2 = 0.719$, which means that the overall planning constructs as a group accounted 71.9 percent of the variation in the delay reduction. This shows a high degree of predictors and reassures the evidence that planning factors when combined have a significant impact on project schedules. The level of the regression significance ($p = 0.004$) shows that the model is strongly supported. The results are consistent with those of Omrany et al. (2023) who state that integration planning is a fundamental factor in realizing project success.

4.6 Connection of Results with Literature

The results are in agreement with the available project planning and project delays literature. Planning Comprehensiveness has a strong impact, which is compatible with such a statement by Burns (2023), who claims that the more detailed the planning, the lesser uncertainty, and the more efficient the execution. The great value of Resource Planning

confirms the idea of Washeleski (2022), who states that resource allocation at the initial stage of the plan helps to reduce bottlenecks.

The beneficial impact of Monitoring and Control aligns with Torres et al. (2025) who also discovered that scheduled progress assessment enhances compliance to scheduling. Moreover, the performance of Tools and Stakeholder Planning is high, which can be explained by the fact that Trecek (2024) emphasizes the increased role of digital tools in enhancing the accuracy of planning and collaboration. The inadequate impact of Risk Planning is indicative of the results of Banerjee (2023), who states that risk processes have not been developed in numerous organisations.

4.7 Conclusion

The chapter outlined detailed research on the quantitative data gathered among the UAE construction professionals. The results indicate that planning comprehensiveness, resource planning, monitoring and control and planning tools and participating in the stakeholders play important roles in reducing the delay, whereas risk planning is not consistent. The regression model affirms that constructs that constitute planning when taken in combination make a significant contribution to the explanation of project delays. These findings support the significance of systematic planning models and the findings offer a solid ground of inferences and suggestions in the following chapter.

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