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OPTIMIZING COMPLEX PROJECT OUTCOMES: THE INFLUENCE OF DECISION FACTORS THROUGH INTUITIVE DECISION-MAKING

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Abstract

In the 21st century, individuals and organizations face increasingly complex challenges in achieving project milestones. Decision-making tools have become crucial for ensuring project success, with decision-driving factors playing a pivotal role in guiding critical choices. While prior research has examined decision-making and project outcomes, limited attention has been given to intuitive decision-making in conjunction with decision-driving factors, particularly within the oil and gas industry.

This quantitative study investigates the impact of intuitive decision-making on project success, considering the moderating role of decision-driving factors using a mediated moderation model. Decision-driving factor items were developed through a three-phase approach based on Godfred (2018). Data were collected via structured questionnaires from employees in Pakistan's oil and gas industry using random sampling. From a population of 11,000, a sample of 372 participants was determined according to Bukhari (2021). Reliability and validity were assessed using Cronbach's alpha, R-square, F-square tests, and validation of higher- and lower-order constructs in SmartPLS 4, followed by hypothesis testing.

Findings indicate that decision-driving factors significantly influence intuitive decision-making, which in turn positively affects project success, and mediates the relationship between decision-making and project outcomes. However, decision-driving factors did not have a direct effect on project success, nor did they moderate the relationship between intuitive decision-making and project success. These results offer practical insights for project managers and decision-makers, highlighting the importance of leveraging intuitive decision-making and understanding key decision-driving factors to enhance project success.

INTRODUCTION

The Oil & Gas exploration has become inevitable need for the sustenance of growing population and industrial development of a country. In this contemporary world, stable energy sector is inevitable for the overall growth and development of any country while it is a major source of economic contribution and growth of Pakistan as one of the most important, challenging and demanding sector (Mukhtar, 2023). Energy must be known as "energy prosperity" as it solves the major economic, social and political problems. Pakistan is considered as a petroleum province. First well was drilled in 1866 at Kendal in the upper region of Indus valley. Shallow wells were drilled after then for many years, and from 1886, small scale production of oil started in Khattan (Baluchistan). In 1915, the first series of

commercial oil discovery was made in the Potohar basin (Punjab). In 1960, Oil and Gas Development Company Limited (OGDCL) was created by the Government of Pakistan, which provided successful track in discovery of oil and gas reserves within the country. After the oil crisis in 1973, a number of impressive discoveries were made both by the private sector and OGDCL. Oil and gas Projects are inherently complex which influences time, cost and quality and even project planning and control of a projects and therefore impede project objectives (San Cristóbal, 2018). Offshore oil and gas are inherently complex as their lead times are usually lengthy and they involve different team setup per project (Lawani, 2021). According to Parsons-Hann (2005) it is evident that complexity contributes to project failure in organizations. In project contexts, there is a lack of consensus on what complexity really is (Loch, 2004.).The project performance has got scrutiny due to crash of oil prices in recent one decade. Decision making plays very important role and is critical for project performance (Ama Lawan, 2023) whereas western societies rely more on social norms (Reimer, 2014). Project success is usually measured by certain metrics such as production, cost, schedule, quality, and operability of projects (Saputelli L. H., 2008) and their respective indexes (Rui, 2017). The project management is grounded in socio-material actions that are characterized by human behaviors, often referred to as soft skills (Azim et al., 2010) and prescribed methods (often involving technology) for the purpose of measuring individuals, activities, and the use of resources against predefined time, cost, and quality constraint (Jonas, 2012).The reserve of fuel oil compared in Pakistan as compared to globe is at rank of 54th out of 186 countries. The reserved oil of Pakistan was 0.34 billion barrel back in 2019 while the world average reserve on the base of 186 countries is 8.67 billion barrel (Tambreen Afzal, 2020).Project delays in this industry cause host of whole issues if the effective decisions are not taken in time which in turn can cause another day paying for personnel and other resources for every late day which were not factored into project budget (Cicmil, 2017), in particular, increase in cost and time of large complex (Muhammad Ruqaishi, 2015).Project managers generally rely on analytical approach for decision making (Al-Harbi, 2001) and (Hazır, 2015) while analytical decision making have been identified with many challenges (e.g., absence of feelings, emotions, motives of project stakeholders and over dependence on availability of accurate information (Parth, 2013), while others suggested for fact-based analysis obtained from experience which impacts the decision made (Huff, 2008). There is emerging evidence of using intuitive decision-making process (Leybourne, 2006) and (Musca, 2014).Apart from naturalistic decision making in risky and volatile environment (in which experienced practitioners make decisions in real world setting and is fast process (Evans, 2007) keeping the consequences in notice), decisions are as well taken by analytical decision making process (sometimes also called as rational decision making in which project leaders make decision based on logic related to project objectives and is lengthy process used by frequent project managers especially fresh or less experienced project managers) (Kahneman, 2010).

1.2 Problem Statement

Energy supplies are the key sources for the economic growth of any country because efficient energy supplies prosper the economy and give fruitful results in farming, manufacturing, trade, domestics and industrial activities for economic growth and development (Amjad, 2021). South Asia shares a large amount of world energy resources. The strategic
position of Pakistan not only emphasizes its political and geographical position but also it suggests an important energy strategy for the country as well because Pakistan is facing huge energy crisis (Khan, 2020).

According to a report published by Islamabad Chamber of Commerce and Industry (ICCI), "Pakistan's energy infrastructure is not well developed; rather
it is considered to be underdeveloped and poorly managed" (Shaikh, 2023) while the massive growth in population and enhancement of industrialization will enhance the demand for oil and gas resources (Wang, 2022).

Executives buried under data don't come up with a number which tell them what to do (Gerd Gigerenzer, a psychologist at Max Plank Institute for Human Development in Berlin). Decision makers in complex projects often get stuck in data when getting narrow understanding of the issue (Farell, 2023). However other than overthinking, they should listen to their guts to help for the right call for projects performance to lead to optimum success.

For the last five decades, oil and gas prices shocks have hit each country and affected each sector of the economy (van de Ven, 2017). Projects related to oil and gas industry pertain to complex environment where different stakeholders are involved to meet their objectives (Musca, 2014). Traditionally analytical decision making has been used while naturalistic decision making is used in real time scenario.

Companies invest in data tools, we face delay in decision making when data fed into these systems is low quality and interpretable, even sometimes data is healthy enough, but it is simply far too much to quantify and interpret into real sights and business results. However, in critical decision-making process where project managers take decisions rather than through their experience based on guts using the force in the sixth sense kind of manner but using formal tools and procedures but there is very limited literature about the factors influencing decision making (Musca, 2014).

Intuitive decision making has been used in literature since the 1970s and 1980s providing important clues for training and development, but intuitions are generally biased in different themes identified in Ama Lawani 2023. From recent years, improving intuitive decision making in these complex projects has got significance pivoting for success and failure of projects. Intuitive decision-making based on this approach should establish an ethical guideline and promote project performance (Johannes Ulrich Siebert, 2021). Factors influencing decision making are widely used for technical, economic, social and environmental assessments within oil and gas industry (Mahmood shafiee, 2019) (Anita Meidell, 2017). While very little literature is available about the factors influencing decision making as well as their moderating role on the relation between intuitive decision making and project success (Ama Lawan, 2023). Project times are usually too short for the decision analysis to be followed (Bickel, 2008)

1.3 Gap Analysis

Despite of significant research studies on different types of decision-making processes in large complex projects of oil and gas industry, there is still gap in comprehensive understanding of interaction of project internal factors, project internal factors, social dimensions, individual differences and individual biasness on intuitive decision-making process (Ama23).

A rapid preferential judgment for one option, a particular weighting score or solution for a problem due to some kind of bias/ heuristic (Robinson, 2020) and we almost never catch ourselves in act of making intuitions errors because most of the decisions are influenced by many people.

The intuitive decision-making process (cognitive process) have not yet been studied in relation with decision driving factors in project management in literature. So this methodological will be be addressed in current study (methodological gap). There is need for the contextual study of the aforesaid methodology in Pakistan.

The decision driving factors also need to be studied for their moderating role on the relationship between intuitive decision making and project success by mediation moderation model. Need for quantitative approach (e.g., a questionnaire survey) would enable the postulated intervening role of decision making between influences and project management outcomes. A scale needs to be developed for decision driving factors in carrying out quantitative approach since its inception in (Ama Lawan, 2023). Research aims to broaden the scope to include Pakistan's oil and gas industry providing insights with greater geographical and sectoral relevance. Research gap suggested for future research in recent literature are shown in Table 1.1.

Table 1.1: Research Gap Suggested in Recent Literature

S. No.	Author	Research Gap
1	Ama Lawani, Rhona Flin, Racheal Folake Ojo-Adedokun, Peter Benton (2023)	A future avenue for research would be to examine the possible interaction between decision driving factors and types of cognitive processing.
2	Ama Lawani, Rhona Flin, Racheal Folake Ojo-Adedokun, Peter Benton (2023)	A quantitative approach (e.g., a questionnaire survey) would enable the postulated intervening role of decision making between influences and project management outcomes to be modelled.
3	Stingl & Geraldi, 2017	There is a limited literature on factors influencing project decision making.

1.4 Research Questions

This study is conducted to fill the above stated research gaps. The main research queries are:

a. Do the decision driving factors impact project success?

b. Do the decision driving factors impact intuitive decision-making process?

c. Does intuitive decision-making process impact project success?

d. Do decision driving factors moderate the relationship between intuitive decision making process and project success?

e. Does intuitive decision-making process mediate the relationship between decision driving factors and project success?

1.5 Research Objectives

a) To examine the impact of decision driving factors on project success.

b) To examine the impact of decision driving factors on intuitive decision-making process.

c) To examine the impact of intuitive decision-making process on project success.

d) To investigate the moderating effect of decision driving factors on the relationship between intuitive decision making and project success

e) To investigate the mediating effect of intuitive decision-making process on the relationship between decision driving factors and project success.

1.6 Significance of Research

This model will assist natural resources exploration industrial companies in understanding how to manage decision driving factors and potential effects that may extend beyond their operational limitation. This study will help not only theoretically but also the experienced practitioners and other implementation agencies to understand that at what extent intuitive decision making affects the success of the project which would help to improve the future projects performance by avoiding the same causes. It will help oil and gas Project Managers in Pakistan for decision making process as if they know the impact of on intuitive decision making process and intuitive decision making process's impact on project success, they can take better decision in planning and implementation stage in oil and gas industry of Pakistan across exploration sites all over Pakistan. This study is of a novel character as it contributes to body of knowledge in literature and the approach it uses enables continuous project improvement.

2 LITERATURE REVIEW

2.1 Complex projects

A complex project is a project that involves a high degree of difficulty, uncertainty, and risk due to a variety of factors such as the size, scope, duration, and interdependencies of the project. Complex projects typically involve multiple stakeholders, complex processes, and multiple disciplines. Since natural resources are crucial in this modern life, therefore it is constant debate that how to protect them, maximize their usage, setting fair pricing, and

preventing misuse. Energy supply financing is crucial, particularly for developing nations like Pakistan. The oil and gas industry projects have been historically criticized for their poor levels of managing projects with regards to delivery and inefficient practices across various projects. when it comes to a mega project the risk of project success is increased and without effective decisions taken by strong and effective team of field officers/project managers most projects suffer from extensive corrective action and rework costs. Complex projects are highly strategic, emergent and adaptive systems comprising either a major sized project or a program that are characterized by an embodied holistic entrepreneurial mission; high-profile project modeling as a holistic project mission entrains high uncertainty in scope definition, hence scalability, while adapting to changing environments; recursiveness as they mobilize a variety of stakeholders having multiple objectives financing options and nonlinear feedback loops (Tanaka, 2014).

2.2 Intuitive decision making process

A mental process based on 'gut feeling' as opposed to systematic, explicit analysis yielding an intuitive insight or judgment that is used as basis for decision making (Elbanna, 2013). At the beginning of this century, researchers embarked on a more scientific type of intuition research based on theoretical and empirical work (Akinci, 2012). Though it is clear now that managers do not focus entirely on rational approaches (Floricel, 2014.), the softer sides of the human intelligence, and specifically the role of intuition in managerial actions still provide more questions than answers management research: insights from social theories (Akinci, 2012).

From literature, intuition has three types i-e holistic intuition, inferential intuition, affective intuition (jean e. pretz, 2014). Holistic intuition pertains to qualitative non analytical process. In this type, decisions are taken by integrating multiple, diverse cues into whole that may be explicit in nature. Inferential intuitions are basically judgments pivoting on automated inferences, decision-making processes that were once analytical (rational) but have become intuitive with practice. Inferential intuition in contrast corresponds to intuitive judgments based on automated analysis. Affective intuitions are judgments based on emotional reactions to decision situations primarily. These three types were previously considered in an empirical and theoretical analysis of current and historical work on intuition (Pretz, 2007). We will adopt questionnaire used by (jean e. Pretz, 2014).

2.3 Decision driving factors

Literature identified different decision factors influencing complex projects by adopting naturalistic decision making used by the experienced project managers in front end loading (Ama Lawan, 2023) of complex projects of oil and industry. These decision driving factors are project internal factors, project external factors, social dimensions, project constraints, individual differences and social dimensions.

2.3.1 Project external factors:

External enterprise environment factors encompass the external conditions that influence decision-making in project management. These factors include market competition, legal and regulatory frameworks, economic conditions, and technological advancements as economic changes impact technical and cost feasibility (Montequín, 2018). Studies have found that organizations operating in dynamic and competitive environments face complex decision-making challenges. Adapting to changing market conditions, complying with regulations, and leveraging technological advancements are critical for project success. Organizational process assets should be kept ensuring effective decision (Rezvani & Khosravi, 2019). Likewise, Government regulations impact the effectiveness of decisions and cause project delay (Saputelli, Hull, 2008). Ignoring external factors or making decisions without considering their impact can lead to project failure.

2.3.2 Project internal factors:

Internal enterprise environment factors refer to the conditions and characteristics within an organization that influence decision-making. These factors include organizational culture, leadership style, communication channels, and resource availability.

While selecting projects, consideration of important fits are strategically misinterpreted which cause ineffective responses, that is why most of the decisions are deviated (Saputelli, Hull, & Alfonzo, 2008). Research suggests that a supportive organizational culture, participative leadership, effective communication, and adequate resources positively impact decision-making processes and contribute to project success. Conversely, a lack of resources, hierarchical decision-making structures, and a rigid organizational culture may impede effective decision-making and hinder project success.

2.3.3 Social dimensions:

Social factors refer to the interpersonal dynamics within project teams and how they influence decision-making. These factors include team collaboration, trust, conflict resolution, and diversity (Marr, 2017) and (Saputelli & Black, 2013). Research highlights the importance of effective teamwork and collaboration in decision-making processes. Trust along with open communication promote information sharing and enhance decision quality (Kostis, 2022). Conflict resolution skills are vital for addressing disagreements constructively and reaching consensus. Moreover, diverse teams bring different perspectives and expertise, leading to better decision outcomes.

2.3.4 Individual differences:

It refers to personality trait that affects decision making such as confidence, individual risk appetite and competence (T Creasy, 2023)**.** These differences can lead to flawed judgments and decisions which undermine the confidence of team members (Roberts et al., 2021). Research suggests that awareness of individual differences and the implementation of decision-making frameworks that mitigate individual differences can improve decision quality and project outcomes.

2.3.5 Time pressure:

Time pressure refers to the constraints imposed by project schedules or deadlines that affect decision-making. Studies indicate that time pressure can have both positive and negative effects on decision-making. On one hand, it can stimulate creativity and prompt quick decision-making. On the other hand, excessive time pressure can result in rushed and suboptimal decisions. Finding the right balance between speed and deliberation is crucial for effective decision-making under time constraints. Likewise spending disproportionate time on less important things than on important things (bike shedding) can also infect the decision making (Mcfedries, 2017).

2.4 Project success

"The project's ability to deliver sustainable outcomes, collaboratively and efficiently" is the operational definition of project success. Project success stays fixated at top of sex triple constraints of cost, scope, schedule and quality. However, advancements and globalization in technology has adequately widened the definition of project success (Ahmad, 2021). Most of the complex oil and gas project are witnessed to be delayed and overrun by cost in Pakistan (Nisar, 2023). Although a great deal of effort is normally spent on measuring project success (Joslin, 2016), (Misic, 2015), however after decades of research there is no consensus on the meaning or factors of project success defined in red line metro project (Meredith, 2019). Project success is not only linked with techniques, aspects, technical aspects but also to uncertainty and complexity of the projects. Complexity is totally split with the technical issues that make complex projects making it much more important how you manage it. More the complex is project, more the project manager has to manage all people and working condition (Virender Kumar1, 2023) to achieve goal. Complex project involves many different stakeholders or many different finances many different elements of project itself that don't go all together. Summary of the measures of project success (Virender Kumar1, 2023) is shown in Table 2.3.

2.5 Research Model:

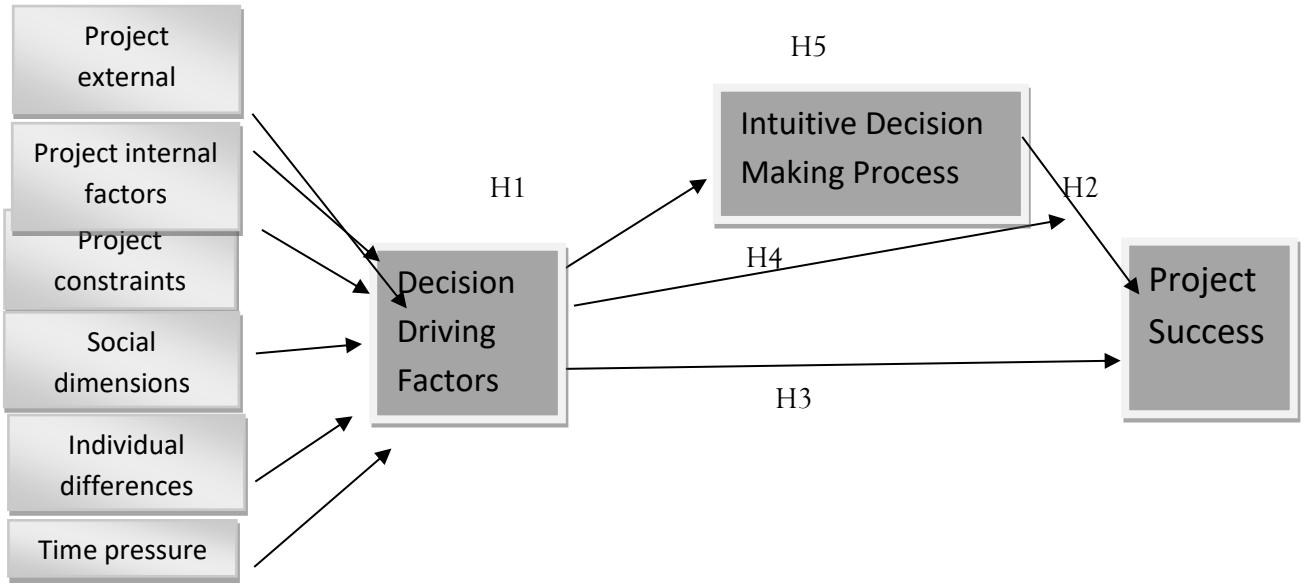


Figure 2.1 Research Model 74

2.6 Research Hypothesis

H1: Decision driving factors have significant impact on intuitive decision making process.

H2: Intuitive decision making process has significant impact on success of oil and gas complex projects.

H3: Decision driving factors significantly impact the success of oil and gas complex projects.

H_4: Decision driving factors significantly moderate the relationship between intuitive decision making process and project success.

H_5: Intuitive decision making significantly mediates the relationship between decision driving factors and project success

RESEARCH METHODOLOGY

3.1 Introduction

As we have discussed the design model of our research in our previous chapter, on the basis of that model we have tried to develop the relationship between dependent variable, independent variable along with mediator and moderator through mediated moderation model. In this chapter, the type of data, study setting, population, data collection plan and research ethics has been discussed.

3.2 Research Design

Research design is the answer to our research questions. In our case, descriptive research was carried out after creation of items identified in literature. Factors of decision driving factors are studied from literature about decision making

3.3 Research method

It is a strategy which is used to implement that is planned. There are two types of conducting research which are qualitative and quantitative method. In our case, work is related to quantitative method. In our case, impact of decision driving factors and intuitive decision making has been calculated on the success rate of projects.

3.4 Study setting

The participants in our research study are the project managers, decision makers, and the project leads of oil and gas projects. Some of the projects in our research are completed and others are under progress from last ten years i-e 2013~2023. Data has been collected from them through questionnaires and google forms.

3.5 Unit of analysis

It is actually entity or the subject on which we are intended to comment in our study. In our case, it is success of oil and gas projects on Pakistan.

3.6 Data collection plan

In this research, data is initially collected through various relevant articles which is secondary data. While primary data is collected in the form of questionnaires through google forms (survey forms).

3.7 Research approach

Deduction is a systematic process whose goal is to draw a valid consequence from a series of premises. It requires to consider the premises as true, to infer them and follow what conclusion are. By definition, a valid deduction yields a conclusion given that the premises are true (Bara, 2001). We have used deduction approach in our research because this approach involves developing (or adopting) a theory and hypothesis, which is then designed in a research strategy to test it. As we are testing our theory which is based on models that someone else has already developed, therefore it is suggested to use deductive approach in cross sectional study. It is a structured approach grounded in scientific principles.

3.8 Population and Sampling

Population of the research will be the oil and gas industry complex projects ongoing in different areas in Pakistan. The study targets 68 projects of oil and gas in Pakistan in which 50x are operated in exploration fields and 18 are processing plants geographically distributed across Pakistan. Sample will be project managers and decision makers of oil and gas development company 's past ten years projects based on Morgan table. 7x projects of MARI are Mari field at dharki (distt ghotki Sindh), Zarghun gas and condensation field (Baluchistan), Sajawal gas condensation field (distt sajawal Sindh), Bolan east oil field (chiltan Baluchistan), halini oil field (Mian Wali), Dharian oilfield (Jhelum Punjab) and kalabagh gas and condensation field. PPL (Pakistan petroleum limited) has 14x oil fields mega projects including Sui gas field. OGDC has 2 ongoing dev projects i-e relocation of kunar lpg in Sindh and jhal magsi gas project in Baluchistan. 3x ongoing compression projects are tando jam in Hyderabad, dakni in jhand attock and in distt dera murad jamali Baluchistan.

Our sample of population is projects managers of oil and gas company's upstream (exploration) projects from last ten years. Sample size has been calculated by bukhari table using Krejcie and Morgan's table (1970) as for population is known in our research used by (Bukhari, Feb 2021).

$S= X^2NP(1-P)/d^2(N-1)+X^2P(1-P)$

Where S= required sample size

X^2= table value of Chi Square for 1 degree of freedom at desired confidence level (3.841)

N= Population size

P= Population proportion (assumed to be 0.5 since this would provide maximum sample size)

d= degree of accuracy expressed as proportion or margin of error (0.05)

Source: Krejcie & Morgan, 1970 (Morgan, K. (1970). Sample size determination using Krejcie and Morgan table. *Kenya Projects Organization (KENPRO)*, *38*, 607-610.)

n (0.05) $S= x^2NP(1-P)/d^2(N-1)+X^2P(1-P)$

In our case, N= 11000.

By using the above mentioned formula, we have calculated the value of S as 372.

Simple random sampling will be used to select participants who are readily available and willing to participate, facilitating efficient data collection. The larger the sample size means less chance of error which can help the study to collect and study the true base analysis (Gill, 2010). For this purpose, the targeted respondents of the survey were the Project managers and decision makers. The justification to use Simple random Sampling technique is that as to get better insight for decision making, we encourage every project manager to participate in response. Second rational of using this technique is to generalize the research.

3.9 Questionnaire Design

The data gathering technique for the study was interviews in case of decision driving factors and then Survey Questionnaire method as this method of data collection is effective method for study and has already been used in many previous studies. The questionnaire was comprised of four parts. First part comprises the creation of items for decision driving factors was carried out and scale was validated by conducting different tests related to factors identified by (Ama Lawan, 2023) and strategy was used from Godfred O. Boateng, (2018). In the second part, respondents were asked to inform about their demographic information e.g., age, qualification, experience. In the third step, questions related to three variables were asked from respective respondents. An online questionnaire survey form of the same was also be developed on "Google Forms"to take the input online.

3.10 Measurement of variable

Table 3.2: Measurement of variables

Variable	Number of Items	Reference
Intuitive decision making	29	(JEAN E. PRETZ, 2014)
Project success	25	(Shenhar, 2007)
Decision driving factors		Scale was developed by the researcher

This section outlines the research methodology for a quantitative method examining the impact of intuitive decision making process on project success, with a focus on the moderating role of decision driving factors and impact of decision driving factors on intuitive decision making process as well through mediation moderation model. After scale development, the study aimed to conduct pilot study of 20 project managers performing their duties in complex projects of oil and gas industry across Pakistan. The goal of this study is to design investigation quantitatively in order to gain deeper insight of the study to gather data in
order to analyze the relationships between variables and test hypotheses.

We have used SMART PLS 4 to test hypothesis as analysis tool. The research questions required the information to be based on project managers' experience in decision making at various stages of oil and gas industry projects especially at upstream level i-e exploration.

We have used projects in our study because it is the project that even having complex nature aims to deliver strategic value (Vedran Zerjava, 2021). Project managers make decisions at front end stages of projects as well as at execution stages based on decision driving factors and ability of project team (e.g., solution or problem focused) and these decisions made are documented as key influences on complex project management. Most of the senior managers were influenced to make intuitive decision making than those of less experienced managers who strongly rely on analytical decision making (Farell, 2023). Given sample after conducting interviews and focused groups discussions was further tested using questionnaire. We have asked respondents of oil and gas development projects various questions to validate decision driving factors scale at specific phases of projects with respect to decision making. Their answers were be transcribed, synthesized, categorized to identify the decision driving factors. Decision driving factors have impact on intuitive decision making and performance of projects which

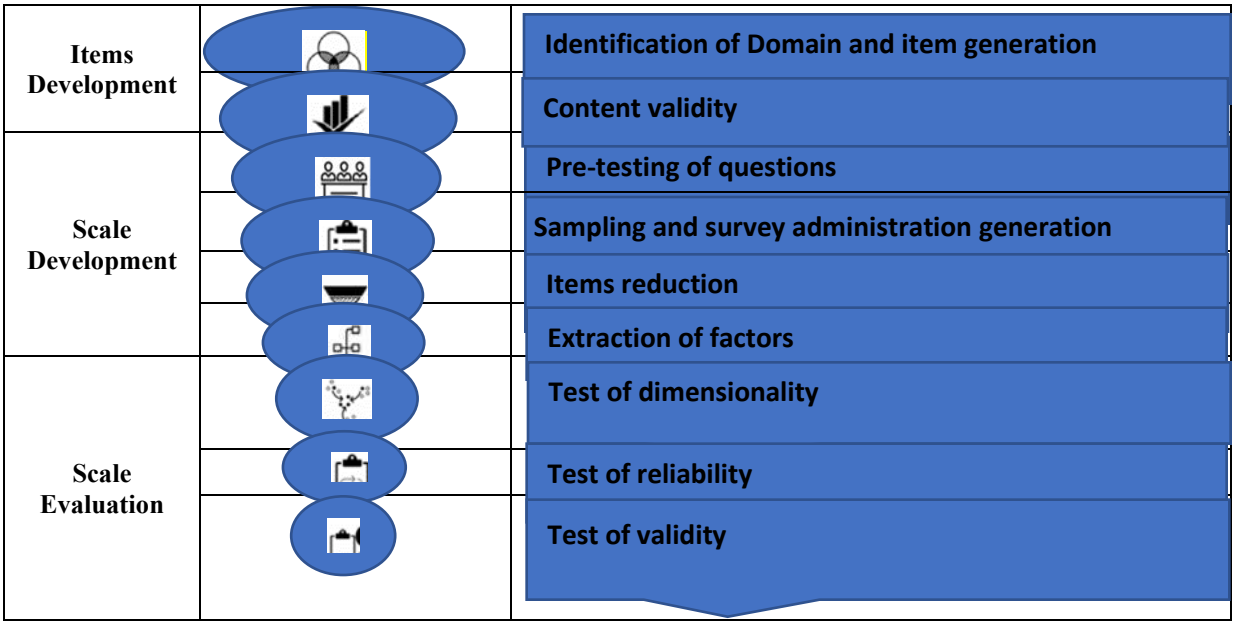
in turn increases project success of the projects. Increase in projects performance increases value of projects which makes projects successful by delivering their objectives (Vedran Zerjava, 2021). In our quantitative study, intuitive decision making is multidimensional and hierarchical concept. Although we have developed the items for decision driving factors identified in literature. To do this, we have created a primer for best practices for scale development in measuring complex phenomena (Godfred O. Boateng, 2018). The logic of this thesis is deductive, as the proposed model was initially designed to study what factors are affecting the decision making.

Items for decision driving factors were created which were introduced in Ama Lawan, (2023) with qualitative approach and were validated. Items creation and items sorting was done through this research by selecting right items for the construct to guarantee the construct by exploratory sequential design (Exploratory sequential design is a type of mixed methods research design in which you collect and analyze qualitative data and then follow up results with a quantitative phase. This mixed qualitative and quantitative research methods design aims to explore a phenomenon).

Research on decision driving factors initially focused on normative models. Such models indicated how people should make decisions. These models predicted the success of the decisions as a function of whether or not individuals behaved in real life of complex project management (Cohen, 1995) in oil and gas industry. This kind of thinking is limited, and it could not explain how people actually make decisions in real, dynamic environments. Recently, descriptive naturalistic models have been developed which emphasize both the features of the context in which decisions are made and the role in decision making of experience and personal competence (Cannon-Bowers, 1996) provided a succinct definition. 'Naturalistic decision-making (NDM) is the way people use their experience to make decisions in field settings (Klein G. , 1997). To go for decision driving factors instrument, we have to follow following nine steps of three phases.

3.10.1 PHASE 1: ITEM DEVELOPMENT

Step 1:Items generation



To generate pool of items for the construct, items were identified at this stage by studying literature. In the first phase, the scientific literature on the constructs of decision driving factors was comprehensively reviewed by means of factors identified in Ama Lawan, (2023). We have made sufficient extensive research on the factors which influence decisions. State of market related to economic changes impact technical and cost feasibility (Montequín, 2018). Economic and technical considerations have considerable effect on decision making (Klakegg, 2016). Weak contracting model increases likelihood of weak contractual system (Rezvani, 2019) and (Eweje, 2012). Best industrial practices assess projects to alleviate risks (Saputelli L. H., 2008). Government regulations affect projects durations (Jergeas, 2008). Change in national tax policies and custom duty rates also affects projects success by considering these factors into decision mkaing (Yau, 2012). Business imperatives and companies culture is also impacts while selecting project fit (Flyvbjerg, 2021) and (Turner, 2020). Stability of cash flows and financial position of companies is crucial while decision making (Mi˘si´c, 2015) and reviewers ideas generate idea to respond to critical situations (Saputelli L. B., 2013). Senior project managers have the ability to influence decision making due to their position (Marr, 2022) and (Kostis, 2022). Behavioral factors and personality influences decision making (Roberts, 2021) and (Kwak, 2005). Relevant stakeholders try to influence decision in their favor (Crawford, 2005). Different methods used to fast track the projects may derail the effective power of decision making (Zirger, 1994). Sometimes output yielded is much more negligible than time invested on analysis (Eric Bickel, 2007 Nov). Rather to spend 45 Min on the nuclear power plant, project managers the bike shedder spent two and a half of time on discussion (Parkinson, 2017) on whether to build nuclear plant or not, (Garber, 2012) in which project managers were habitual to take shortcuts to show the project progress.

Based on study, a list of twenty one items was elaborated, grouped into five factors that related to project managers' thoughts, feelings, and attitudes toward team projects, focusing on benefits or difficulties in completing team projects making it successful from a professional's perspective in critical decision making (whether if they are currently enrolled in a project or if they are not enrolled in a course, but active as practitioners in the workplace). Based on these sources, we developed an initial pool of 21 survey items. The initial pool of items should be considerably more than researchers plan to include in the final scale—in some cases, researchers may "begin with a pool of items that is three or four times as large as the final scale" and in other cases, "as small as 50% larger than the final scale" (DeVellis, 2012). We did not pre-determine a specific number of items to be included in our final survey instrument, although we envisioned it (as a learner analysis tool) to be a relatively short, compared to lengthy (15˜25 items) psychometric instruments. Thus, we considered 21 survey items to be an appropriate initial pool. To make the instrument usable in multidisciplinary team environments and applicable in either face-to-face or virtual workplace settings, we avoided wording such as "engineering managers" or "engineering workstations" in the item statements (Seung Youn Chyung, 2017). We also followed guidelines for designing survey items from Kubiszyn, (1996) to write direct statements, ensured one thought per statement, and avoided double-negatives and double-barreled statements. The appropriate survey items identified through literature review and assessment of existing scales (deductive method) are:

1. **Project External Factors (5 items):**

a) External stakeholder influence on project decisions in weak contractual systems.
b) Economic conditions affecting project outcomes
c) Industrial norms impacting project development to alleviate risks in projects assessing
d) National tax policies and custom
e) Regulatory constraints influencing decision-making

2. **Project Internal Factors (5 items):**

a) External stakeholder influence on project decisions in weak contractual systems

b) Economic conditions affect project outcomes.
c) Industrial norms impact project development to alleviate risks in projects assessing.
d) Regulatory constraints influence decision-making.
e) Financial position of the company.

3. Social Dimension (3 items):

a) Stakeholder relationships and engagement
b) Peer review to generate the ideas
c) Highest paid persons influence decision making

4. Individual Differences (3 items):

a) Decision-making behavioral styles among team members
b) Project manager and protect team competence
c) Team members' attitudes towards risk

5. Time Pressure (3 items)

a) Bike shedding on less important things rather than significant aspects of projects
b) Analysis paralysis caused by benefit cost ratio
c) Shortcuts to show sense of project progress

6. Project constraints (2 items)

a) Project timeline constraints and impact
b) Project timeline constraints and impact

Step 2: Content validity

This step is also known as "theoretical analysis" in which we ensured that each item is relevant, representative and of technical quality constituting decision driving factors (DDF). These items are broadly applicable to our study including (a) the behavioral content has a generally accepted meaning or definition; (b) the domain is unambiguously defined; (c) the content domain is relevant to the purposes of measurement; (d) qualified judges agree that the domain has been adequately sampled based on consensus; and (e) the response content must be reliably observed and evaluated (R., 1977). Expert judgment can be done systematically to avoid bias in the assessment of items (Haynes SN, 1995). We examined items to detect words and expressions that might be difficult to understand, ambiguous or awkwardly phrased items, and to solve any difficulties of the questionnaire regarding presentation, etc. Based on the external professionals' quantitative and qualitative suggestions, we changed the terms of some items, and their sequence number. The result of this phase was the 'Decision driving factors Questionnaire', version "A" comprising 21 items, grouped into 5 factors. These expert judges were senior project managers who were knowledgeable in team-based learning—they served as experts to evaluate the clarity of the items as well as face validity (how relevant the items were to what we intended to measure) in oil and gas development company of Pakistan. These decision makers evaluated each of items to determine whether it represents our constructs effectively by asking them to provide feedback on following criteria:

1. if each item seems a valid measure of attitudes toward team projects,
2. if any items need to be revised to improve clarity or to be removed, and
3. if they want to suggest additional items.

Their assessment has been quantified by using Cohen's coefficient kappa (k) for measuring inter-rater or expert agreement as it is most recommended and most efficient among formalized scaling and statistical procedures such as the content validity ratio for quantifying consensus (C., 1975), content validity index for measuring proportional agreement (M., 1986).

We used SPSS software for this purpose to conduct this test in ninth step to developed reliable items before administering to target population as Smart PLS4 doesn't directly gives us Kappa values.

3.10.2 PHASE 2: SCALE DEVELOPMENT

Step 3: Pre-testing Questions

It is an essential step to minimize the misunderstandings, and possible errors to ensure that the items for DDF are meaningful to the population of oil and gas companies before administering the actual survey (Godfred O. Boateng, 2018). Pre-testing has two components: the first is the examination of the extent to which the questions for DDF reflect the domain of decision-making process. The second is the examination of the extent to which answers to the questions asked to produce valid measurements (FJ., 1995). Fifteen interviews in two rounds were conducted to get saturation, and relatively deeper insights considered ideal for pre-testing (Beatty PC, 2007). In this step, we revised pool of twenty one items based on their feedback. Interviews are necessary for healthy assessment of questions and answers and were reported, along with solutions used to remedy the situation.

Step 4: Survey administration and sample size

Collecting data with minimum measurement errors from an adequate sample size is imperative. This data can be collected using paper and pen/pencil interviewing (PAPI) or Computer Assisted Personal Interviewing (CAPI) on devices like laptops, tablets, or phones discussed in Questionnaire Development System (QDS, www.novaresearch.com) and (GoldsteinM, 2012). Using technology can reduce the errors associated with data entry, allow the collection of data from large samples with minimal cost, increase response rate (Fanning J, 2014), reduce enumerator errors, permit instant feedback (Greenlaw C, 2009), and increase monitoring of data collection and ability to get more confidential data (Dray S, 2016). However, as sample sizes increase, the use of PAPI becomes more expensive, time and labor intensive (Greenlaw C, 2009), and the data are exposed in several ways to human error (Fanning J, 2014). Based on the merits of CAPI over PAPI, it is recommended to use CAPI in data collection for surveys when feasible. Sample size is recognized as a key parameter for the planning of studies in many areas of research. However, for development of scale, heterogeneous sample is recommended to test the potential scale items i-e a sample that both reflects and captures the range of the target population (Clarke LA, 1995). The necessary sample size is dependent on several aspects of any given study, including the level of variation between the variables, and the level of over-determination (i.e., the ratio of variables to number of factors) (MacCallum RC, 1999). The issue of sample size for exploratory factor analysis (EFA) is not as straightforward, however, because an exact minimum size cannot easily be found analytically (Goretzko, 2021) and (Ho, 2006) and because the procedure used involves a greater degree of subjectivity (Pearson, 2008). The sample size for factor analysis should be larger but the more acceptable range would be a ten-to-one ratio (Shrestha, 2021). So, for 21 items it is recommended to have min sample size of 210 however we used the same. We got 157 filled responses from experts. Thus, the response rate was 75%.

Step 5: Items reduction

In scale development, to ensure that only internal consistent, functional and parsimonious items are included, items reduction analysis is conducted (Thurstone L. ., 1947). Therefore, this phase is aimed to identify the items that are not or are the least related to the domain of factors of decision driving factors under study for deletion or modification.

To obtain functional items i-e items that are correlated with each other, discriminate between individual cases, underscore a single or multidimensional domain and contribute significantly to the construct, we used “Classical Test Theory” (CTT) mentioned in X, Fan (1998). We used CTT because it allows us to determine the effect of adding or deleting a given item. In this theory, we used the technique of inter-items and item-total correlation to delete and modify items pool based on items’ desired level from tentative scale.

These correlations often displayed in the form of a matrix are used to examine relationships that exist between individual items in a pool (Raykov T M. G., 2011). Inter-item correlations (also known as polychoric correlations for categorical variables)

examines the extent to which scores on one item are related to scores on all other items in a scale (T., 2015). Also, it examines the extent to which items on a scale are assessing the same content (RL., 2014). Items with very low correlations (<0.3) are less desirable and could be a cue for potential deletion from tentative scale. Inter-item correlation was calculated by using SPSS Software. After this test, we are left with fifteen items.

Step 6: Extraction of factors

In this step of scale development, optimal number of factors, sometimes called domain that fit to a set of our items for factors of decision making is determined. This is done using factor analysis. Factor analysis is a regression model in which observed standardized variables are regressed on unobserved (i.e., latent) factors. Because the variable (decision driving factors) and factors are standardized, the bivariate regression coefficients are also correlations, representing the loading of each observed variable on each factor (McCoach DB, 2013). Thus, factor analysis is used to understand the latent (internal) structure of a set of items, and the extent to which the relationships between the items are internally consistent (McCoach DB, 2013). The extraction of factors can also be used to reduce items. With factor analysis test conducted on SPSS Software, items with factor loadings or slope coefficients that are below 0.30 are considered

inadequate as they contribute <10% variation of the latent construct measured. Hence, it is often recommended to retain items that have factor loadings of 0.40 and above (Raykov T, 2011). Likewise, the items that have cross loading or that appear not to load uniquely on individual factors are deleted. Development of scale stops at this phased step and next step leads to test the reliability, but the factors extracted at this point only provide a hypothetical structure of the scale. After conducting extraction in SPSS, following are the items with slope coefficient of >0.4 while others having lower coefficient of slope were deleted. Following are the items with their coefficients after items reduction step.

Communalities

	Initial	Extraction
External stakeholder influence on project decisions in weak contractual systems.	1.000	.696
Economic conditions affect project outcomes.	1.000	.752
Industrial norms impact project development to alleviate risks in projects assessing.	1.000	.689
Regulatory constraints influence decision-making.	1.000	.653
Organizational Blame culture responses to decision making.	1.000	.607
Financial position of the company	1.000	.710
Stakeholder relationships and engagement	1.000	.743

Peer review to generate the ideas	1.000	.562
Highest paid persons influence decision making	1.000	.613
Project manager and protect team competence	1.000	.804
Team members' attitudes towards risk	1.000	.812
Project timeline constraints and impact	1.000	.406
Bike shedding on less important things rather than significant aspects of projects	1.000	.567
Analysis paralysis caused by benefit cost ratio	1.000	.785
Shortcuts to show sense of project progress	1.000	.586

Extraction Method: Principal Component Analysis.

The dimensionality of these factors needs to be tested in Step 7 before moving on to reliability Step 8 and validity Step 9 assessment.

3.10.3 PHASE 3: SCALE EVALUATION

Step 7: Tests of Dimensionality

In this step, hypothesized factors or factor structure extracted from a previous step is tested at a different time point in a longitudinal study (T, 2014). Exploratory factor analysis is conducted to test using independent cluster model (ICM) (Godfred O. Boateng, 2018). Exploratory factor analysis is a form of psychometric assessment that allows for the systematic comparison of an alternative a priori factor structure based on systematic fit assessment procedures and it estimates the relationship between latent constructs, which have been corrected for measurement errors (Godfred O. Boateng, 2018). It relies on highly restrictive ICM, in which cross-loadings between items and non-target factors are assumed to be exactly zero with a meaningful satisfactory threshold (Morin AJS, 2016). Root Mean Square Error of Approximation (RMSEA ≤ 0.06) is one of the most common techniques of testing dimensionality (Bond TG, 2013).

The contribution of each individual item to this factor is considered a weight, with the factor loading value representing the weight. The scores associated with each factor in a model then represent a composite scale score based on a weighted sum of the individual items using factor loadings (DJ, 1973). In general, it does not make much difference in the performance of the scale if scales are computed as unweighted items (e.g., mean or sum scores) or weighted items (e.g., factor scores).

Rotated Component Matrix[a]

Variables	Component					
	1	2	3	4	5	6
Highest paid persons influence decision making.	0.741					
Organizational Blame culture responses to	0.725					

decision making.						
Industrial norms impact project development to alleviate risks in projects assessing.	0.550					
Economic conditions affect project outcomes.		0.810				
Bike shedding on less important things rather than significant aspects of projects		0.701				
External stakeholder influence on project decisions in weak contractual systems.		0.592				
Analysis paralysis caused by benefit cost ratio			0.827			
Stakeholder relationships and engagement			0.739			
Financial position of the company				0.827		
Shortcuts to show sense of project progress				0.703		
Peer review to generate the ideas				0.475		
Team members' attitudes towards risk					0.892	
Project manager and protect team competence					0.824	
Regulatory constraints influence decision-making.						0.792
Project timeline constraints and impact						0.621
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 6 iterations.						

Step 8: Tests of Reliability

Reliability of scale was assessed by using standard statistics of Cronbach's alpha (Cronbach, 1951). Reliability is the degree of consistency exhibited when a measurement is repeated under identical conditions (M, 2008). Cronbach's alpha assesses the internal consistency of the scale items, i.e., the degree to which the set of items in the scale co-vary, relative to their sum score (LJC51) (DeV121) (Ray111). Alpha coefficient of 0.70 is regarded as an acceptable threshold for reliability, however, 0.80 and 0.95 is preferred for the psychometric quality of scales (Nunnally, 1978) (Cronbach, 1951) (Bernstein I, 1994).

We have used Cronbach's alpha test as it has been the most common and seems to have received general approval as shown below.

Step 9: Tests of validity

This instrument is a measure which is used for the latent dimension or construct it was developed to evaluate (Raykov T M. G., 2011). Validation actually starts from first step of phase one i-e identification and items generation and continues to generalize with other constructs (step nine) as mentioned in (S, 1995). Validation of instrument can be examined through number of ways while we have used the most common tests for validity as described in step 2, which can be done prior to the instrument being administered to the target population, and criterion which occurs after survey administration (Godfred O. Boateng, 2018). Cohen Cappa test has been

performed vide all indicators and values yielded were >0.4 with significance level of 0.000 ~0.05. Kappa values >= 0.5 show moderate agreement, >=0.7 show good agreement and >=0.8 show very good agreement (C., 1975).

1. **Project External Factors (4 items):**
   - a) External stakeholder influence on project decisions in weak contractual systems.
   - b) Economic conditions affect project outcomes.
   - c) Industrial norms impact project development to alleviate risks in projects assessing.
   - d) Regulatory constraints influence decision-making.
2. **Project Internal Factors (2 items):**
   - e) Organizational Blame culture responses to decision making.
   - f) Financial position of the company.
3. **Social Dimension (3 items):**
   - g) Stakeholder engagement.
   - h) Peer review to generate the ideas.
   - i) Highest paid persons influence decision making.
4. **Individual Differences (2 items):**
   - j) Competent individual behavior towards the important aspects of project.
   - k) Team members' attitudes towards risk.
5. **Time Pressure (4 items)**
   - l) Project timeline constraints and impact.
   - m) Bike shedding on less important things rather than significant aspects of projects.
   - n) Analysis paralysis caused by benefit cost ratio.
   - o) Shortcuts to show sense of project progress.

3.11 Statistical Techniques

Analysis will be performed using SMART PLS 4 software for data analysis and results of the study. Cronbach's coefficient α (Devellis, 1991) values were calculated (Carmines and Zeller 1979) to check the validity and determine the internal reliability of the frequency and impact size data (Grant & Davis, 1997) . Explanatory factor analysis (Albright & Park, 2009) was also run on the obtained results to check this data is appropriate for the new population. The same method SMART PLS 4 software was used to calculate Correlation and Linear Regression Analysis.

There will be no biased interference of the researcher. The results will be presented as viewed by the respondents of the study.

3.12 Research Ethics

The respondents were assured about the confidentiality of their provided information and only use for research purpose for this study. No official information of an organization was shared during the visit of oil and gas companies for

questionnaire survey. No human or psychological issue involved in this study. The results will also be shared with the respective organizations so that it can benefit from this study in decision making and improving the project success.

3.13 Pilot study

Pilot study of twenty senior practitioners was conducted to assess initial measurement scale. Further scale refinement was performed by examining corrected item–total correlation to improve the reliability and then refined model will be explained. For "decision driving factors" the scale had been validated and measured by exploratory factor analysis.

Table for items creation of decision driving factors

Theme	Sub Themes/Concept	Description
Project External Factors	Market condition (13)	Commerciality or state of the market relating to economic changes impacting on technical and cost feasibility (Montequín et al., 2018). Economic and Technical considerations (Klakegg et al., 2016).
	Contractual factors (5)	Contracting model in terms of the intricacies which increases the likelihood of weak contractual systems (Rezvani & Khosravi, 2019).
	Industry Norm: Benchmarking (4) and Data/information management (6)	Standards for ensuring and maintaining best industry practices by using information quality feed (Eweje et al. 2012) and assessing projects to alleviate risks (Saputelli, Hull, & Alfonzo, 2008).
	Regulatory factors (6)	Government regulations which affect the project duration (Jergeas 2008). Also changes in national tax policies and custom duties etc. (Yau & Yang, 2012).
Project Internal Factors	Business imperatives (7)	The consideration of a strategic fit when selecting projects. Flyvbjerg (2021) refer to these as strategic misinterpretations.
	Company culture: Leadership & Empowering project team (7), Company risk acceptance (7), Blame culture (1)	Company's culture relating to responsibility and responsiveness of decision-making, risk appetite/ tolerance and leadership style (Turner, 2020).
	Company cashflow (7)	Financial standing of companies /a stable business cashflow (Mišić & Radujković, 2015).
Social Dimensions	Peer review (8)	Open mental process where team of reviewers generate various ideas/perspectives about a subject matter within a time frame (Saputelli & Black, 2013).
	Highest paid person's opinion (HIPPO) (7)	Top senior executives' ability to influence the decision making in a project due to their position (Marr, 2017).
	Partnership (5)	Trust issues in partnering and collaborative working (Kostis, 2022).
	Stakeholder alignment (6)	Stakeholders' complexity and alignment between project teams and other relevant stakeholders (Crawford 2005).
Individual Differences	Personality traits e.g., confidence (4) and individual risk appetite (1)	Behavioural factors comprising personality traits (Roberts et al., 2021) and those related to confidence and risk appetite (Kwak & LaPlace, 2005).
	Competence (4)	Project manager and team member skills and competence (Crawford, 2005).
Time Pressure	Accelerating projects (7)	Method used to fast-track projects, e.g., reducing lag/lead times (Zirger & Hartley, 1994).
	Analysis paralysis (3)	Getting less value from analysis than the time invested in the process (Eric Bickel & Bratvold, 2007).
	'Bike shedding' (3)	Tendency to spend a disproportionate amount of time on the less important things rather than attending to the more significant aspects of a project (Mcfedries, 2017).
	Taking shortcuts (4)	Circumventing processes or ignoring requirements to show a sense of a project's progression (Garber & Paté-Cornell, 2012).

Chapter :4 Results

4.1 Overview

In this chapter, demography of the collected data is presented. We performed lower order construct for to set loading, at first. Further, Cronbach alpha test was conducted for reliability. After then, path coefficient analysis was performed to determine coefficient validity. Then multicollinearity statistics was tested to check correlation between items of items. Convergent validity and discriminant validity test were performed to validate constructs. Correlation analysis on the variables to check the relation between variables was performed and R square along with F square test was also performed to validate the hypothesis of the independent variable on dependent variable and mediators through mediated moderation model likewise.

4.2 Analysis of respondent profile

372 questionnaires were distributed among the project managers and decision makers of oil and gas company Pakistan. Yet 339 were returned and were deemed appropriate for further analysis. The respondent profile analysis indicated that 91% of the total appropriate returned questionnaires for data. Respondents' profile is indicated in following table:

Representative Data

No of distributed questionnaires	372
Completely filled forms returned	339
Uncompleted forms returned	0
Not returned	33
Percentage of uncompleted surveys returned	0%
Percentage of completed surveys returned	91%
Percentage of not returned	9%

4.3 Demography

The population of the study is the project managers of oil and gas companies registered in Pakistan. Data was collected from these companies that have undertaken various oil and gas exploration projects across different cities of Pakistan. The demographic profile of all respondents is given in table.

Table (age)

Age	**Frequency**	**Percentage**
26~35	57	16.8
36~45	219	64.7
46~55	22	6.4
56 and above	41	12.1
Total	**339**	**100**

Table (Managerial experience)

Practical Working Experience	**Frequency**	**Percentage**
0~4 years	51	15
5~8 years	79	23.3
9~12 years	59	17.4
13~16 years	35	10.4
17~20 years	66	19.4
21 and above	49	14.5
Total	**339**	**100**

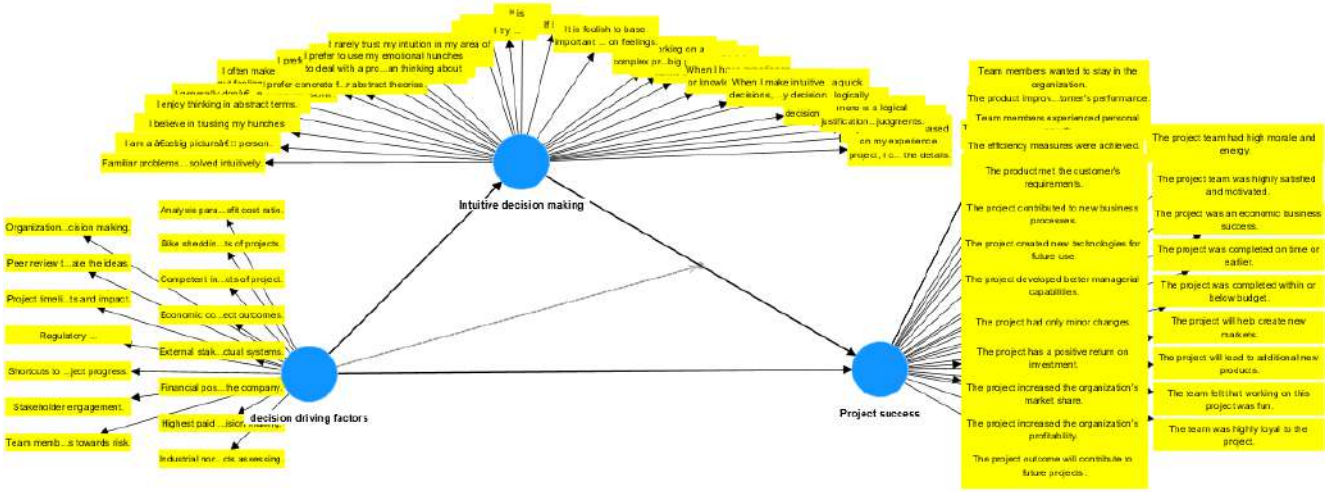
Table qualification)

Qualification	**Frequency**	**Percentage**
Diploma	79	23.4
Bachelors	142	41.9
Masters	74	21.8
PHD	44	12.9
Total	**339**	**100**

4.4 Measurement model

The model studied in the studies is depicted in the figure below. It involves decision driving factors (DDs) as independent variable as well as moderating variable along with its five dimensions, i.e., Project external factors, Project internal factors, Individual differences, social biasness, and Time pressure, Project success was a dependent variable (endogenous variable) where Intuitive decision-making process was a mediator. Fifteen items were

used to measure DDs, Twenty-Five for Intuitive decision-making process, and Twenty-Nine for Project success. To validate a model presented in our studies, the data analysis where first carried to validates the lower and higher order construction. In the model, Decision driving factors, Intuitive decision making process were lower order where Project success and Intuitive decision making process was a higher order construct.



4.5 Lower order construct validation

The model for validation the lower order construct is present in figure below. It involves validation of decision driving factors, intuitive decision making, project success. First PLS algorithm was applied to calculate the outer loading. The value of outer loading ranges from 0 to 1 whereas 0.40 is acceptable value. Removing item with an outer loading value ranging below from 0.40 result in increasing the composite reliability (Ab Hamid, 2017 September). For this study, all the outer loading were above 0.4 and illustrated in the table below along with figure.

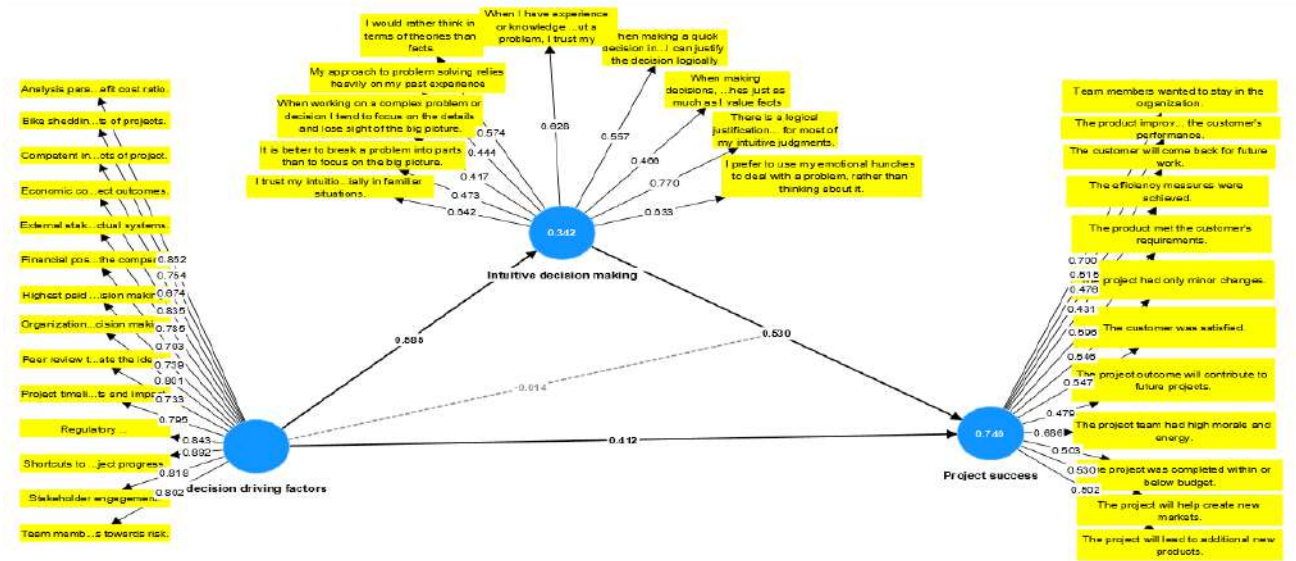


FIGURE FOR LOWER CONSTRUCT MODEL WITH OVER LOADING

Table for Lower order construct model with over loading

	Decision driving factors	Intuitive decision making	Project success	Decision driving factors x Intuitive decision making
Analysis paralysis caused by benefit cost ratio.	0.852			
Bike shedding on less important things rather than significant aspects of projects.	0.754			
Competent individual behavior towards the important aspects of project.	0.674			
Economic conditions affect project outcomes.	0.835			
External stakeholder influence on project decisions in weak contractual systems.	0.785			
Financial position of the company.	0.703			
Highest paid persons influence decision making.	0.739			
I prefer to use my emotional hunches to deal with a problem, rather than thinking about it.		0.633		
I trust my intuitions, especially in familiar situations.		0.642		
I would rather think in terms of theories than facts.		0.574		
It is better to break a problem into parts than to focus on the big picture.		0.473		
My approach to problem solving relies heavily on my past experience		0.444		
Organizational Blame culture responses to decision making.	0.801			
Peer review to generate the ideas.	0.733			
Project timeline constraints and impact.	0.795			
Regulatory constraints influence decision-making.	0.843			
Shortcuts to show sense of project progress.	0.892			
Stakeholder engagement.	0.818			
Team members wanted to stay in the organization.			0.7	
Team members' attitudes towards risk.	0.802			
The customer was satisfied.			0.547	
The customer will come back for future work.			0.476	
The efficiency measures were achieved.			0.431	
The product improved the customer's performance.			0.515	
The product met the customer's requirements.			0.596	
The project had only minor changes.			0.546	
The project outcome will contribute to future projects.			0.479	
The project team had high morale and energy.			0.686	
The project was completed within or below budget.			0.503	
The project will help create new markets.			0.53	

The project will lead to additional new products.			0.502	
There is a logical justification for most of my intuitive judgments.		0.77		
When I have experience or knowledge about a problem, I trust my intuitions.		0.628		
When making a quick decision in my area of expertise, I can justify the decision logically		0.557		
When making decisions, I value my feelings and hunches just as much as I value facts		0.466		
When working on a complex problem or decision I tend to focus on the details and lose sight of the big picture.		0.417		
Decision driving factors x Intuitive decision making				1

4.6 Descriptive analysis

Table (descriptive data)

	Mean	Median	Observed min	Observed max	Standard deviation	Excess kurtosis	Skewness	Number of observations used	Cramer-von Mises test statistic	Cramer-von Mises p value
DDs	4.009	4.333	1.6	4.667	0.798	2.677	-2.045	339	11.394	0
IDM	4.396	4.5	3.321	4.821	0.294	3.8	-2.02	339	5.622	0
PS	4.281	4.4	3.2	4.72	0.354	1.376	-1.511	339	4.949	0

Skewness shows asymmetry of probability distribution, to indicate distribution of data. Negative skewness represents that most of the respondents' answers were encouraging our research objectives in favor of hypothesis, and we have longer left tail. While kurtosis measures tail' thickness. Positive values show fatter tails (leptokurtic) compared to normal distribution. DDs has more fatter tail than IDM and likewise IDM' value is higher than PS.

4.7 Reliability analysis & path coefficient analysis

Reliability analysis

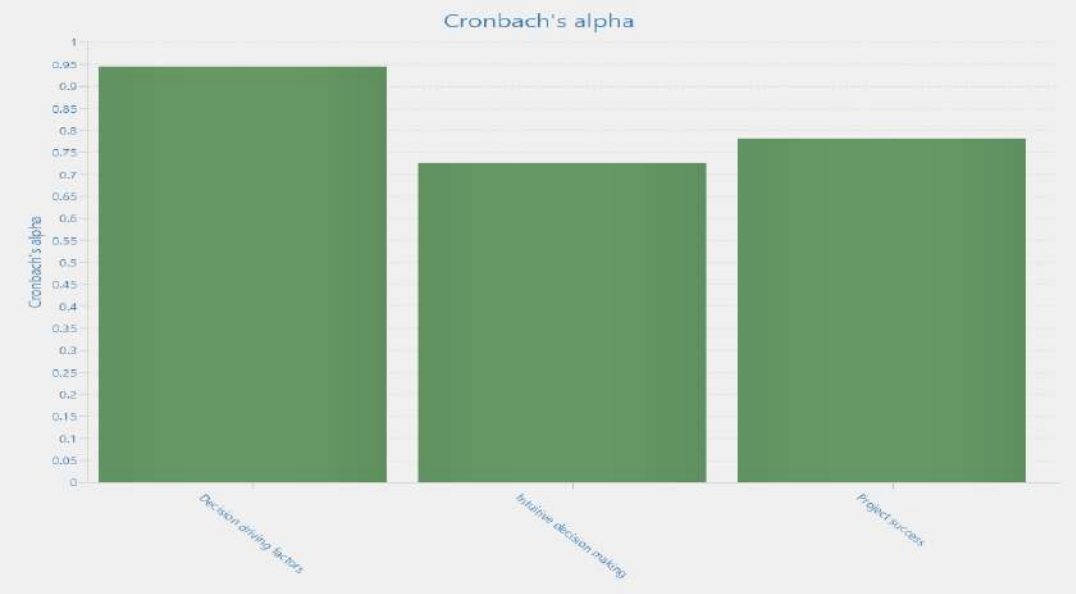
Reliability examines the stability and consistency of the instrument used in studies. In other words, it determines whether the instrument is of high quality or not. Cronbach's alpha is the most common method to analyze the reliability as it considers that all the item involved in the studies are equal outer loading. Where composite reliability considers the varying outer loading to determine internal consistency (Ab Hamid, 2017 September). The accepted value of cronbach alpha and composite reliability are 0.7 and >0.7 respectively (Kocak, 2014). The cronbach alpha and reliability value for decision driving factors, intuitive decision making, and project success was greater than 0.70. Scale reliability refers to the consistency and dependability of a measurement scale used to gather data for research. It is used to ensures that the instruments employed to collect data yield reliable and trustworthy results. The researchers usually use statistical techniques to assess the reliability of a scale, with one of the most common methods being Cronbach's alpha. This coefficient measures the internal consistency of a scale by examining the extent to which individual items within the scale correlate with each other. A higher Cronbach's alpha indicates higher the reliability, suggesting that the items are measuring the same underlying construct consistently. The value of cronbach alpha ranges from 0 and 1. More the value is closer to 1,

more reliable the data is. According to (Kocak, 2014), the value of cronbach should be 0.7, so we used cutoff value of 0.7 for all items included in the questionnaire used in the survey. The value of cronbach alpha for all items used in the questionnaire is greater than 0.7 as shown in the table, it led to ensure that the data is reliable as indicated by (Kocak, 2014) for further computation.

Table for cronbach alpha (α) in lieu of Reliability Analysis

Variable	Reliability Statistics	
	No of items	Cronbach's Alpha
Decision driving factors	15	0.944
Intuitive decision making	29	0.725
Project success	25	0.780

Graph for Cronbach's alpha

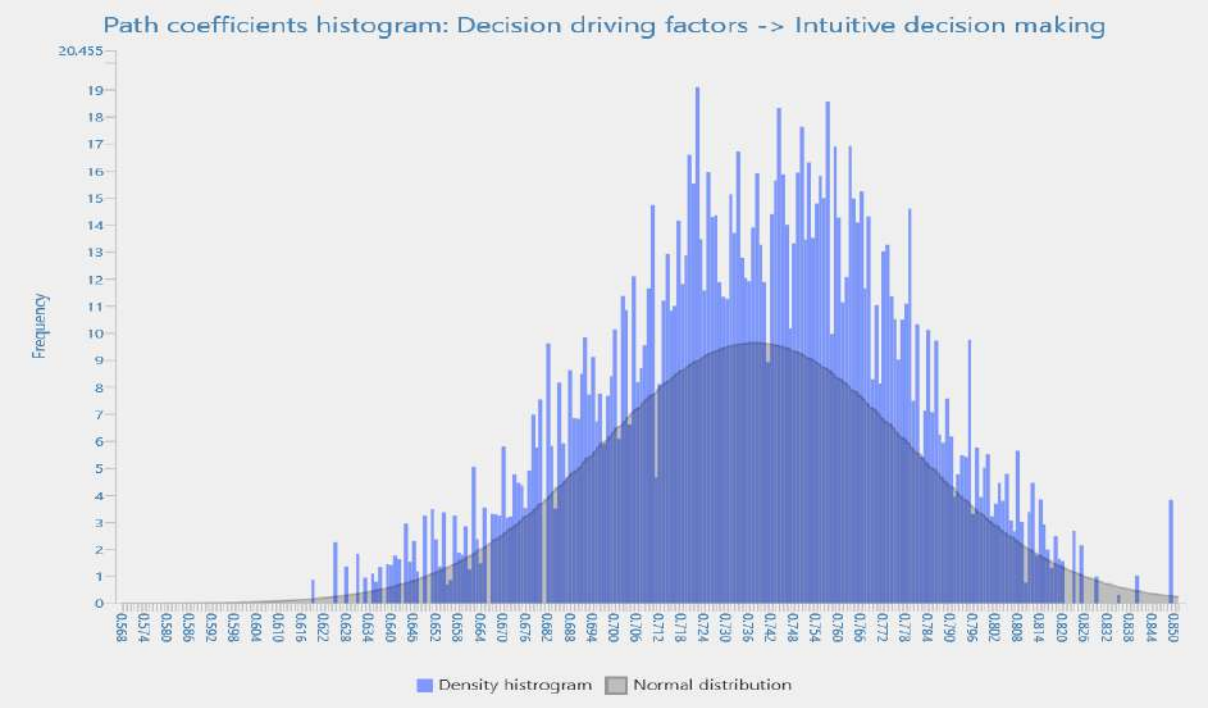


Path coefficient analysis

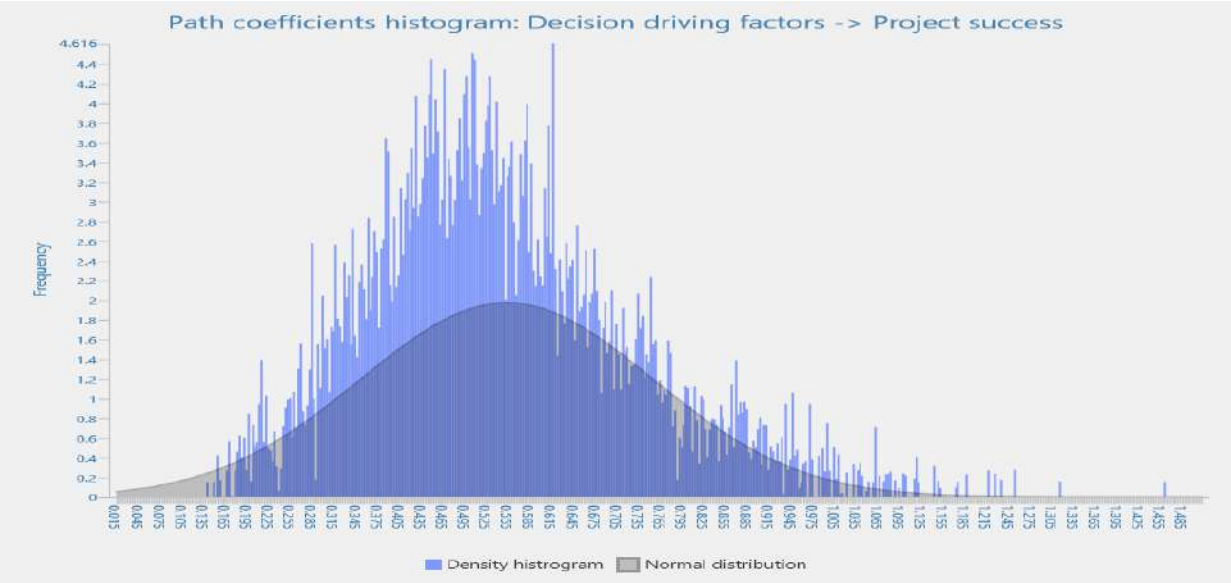
It is a statistical technique which represents the strength and direction of relation between latent variable observed variable whereas latent variables are unobserved constructs or factors that are inferred from observed variables typically represented by circle in SEM diagram. Observed variables are measurable indicators or variables that are directly observed or measured. They are often represented as rectangles in SEM diagrams. Path coefficient is essentially a standardized regression coefficient whose relationship is represented by path.

Standardized coefficients are useful for comparing the strength of relationships on a standardized scale (ranging from -1 to 1), while unstandardized coefficients are in the original measurement units of the variables. In general, Cramer-von mises p value stands for probability and measures how likely it is that any observed difference between groups is due to chance. Being a probability, P can take any value between 0 and 1. P-value is the probability that sample results are as extreme as or more extreme than the result observed in the data if the null hypothesis is true. P-values are calculated from the null distribution of the test statistic. They tell you

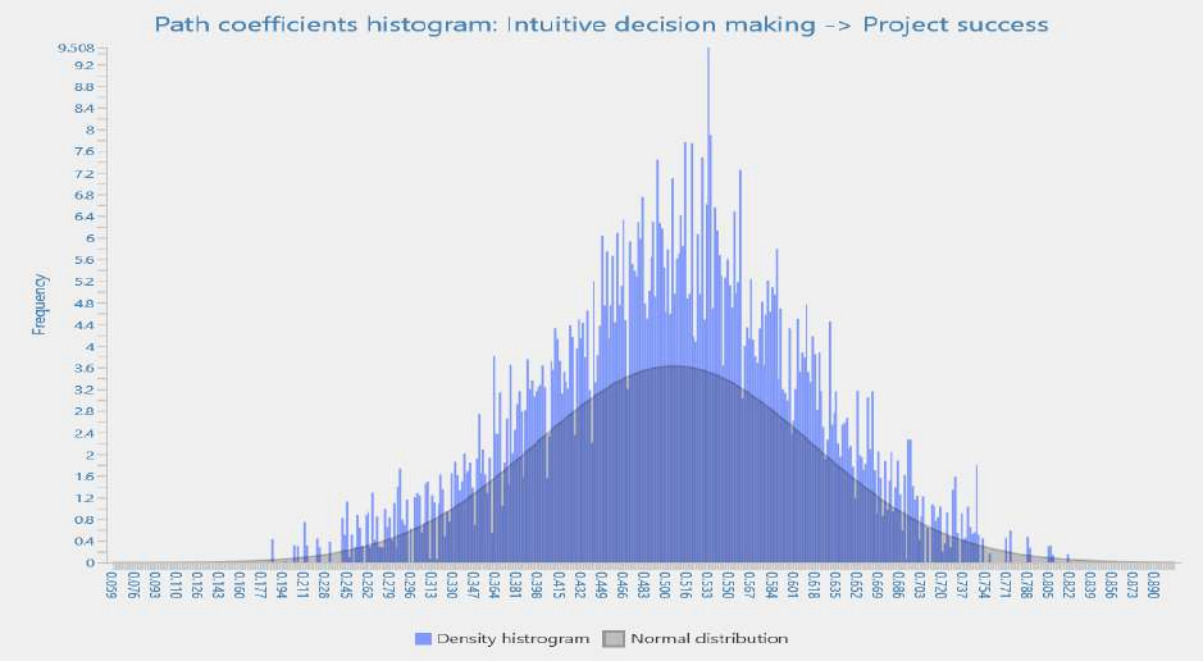
how often a test statistic is expected to occur under the null hypothesis of the statistical test, based on where it falls in the null distribution. The P stands for probability and measures how likely it is that any observed difference between groups is due to chance.In my research case, the results for DDs -> IDM, whereas are as original sample is 0.730, samplemean is 0.738, std deviation is 0.041, T statistics is 17.619 and P value is 0 as shown in given below graph which is standardized coefficient as it ranges from 1 to -1 and indicates that value is above to lowest p-value chosen significance level (p = 0) as shown in in table. It rejects our null hypothesis that path coefficient is zero. This clearly shows that the path coefficient is significantly different from zero. As for positive sign indicates that “decision driving factors” positively influence intuitive decision making. This advocates in favor of our hypothesis that decision driving factors influence “intuitive decision making” positively.



As for Decision driving factors -> Project success, original sample is 0.561, sample mean is 0.554, std deviation is 0.202, T statistics is 2.782 and P value is 0.005 as shown in given below graph in our research indicates the standardized coefficient in which positive sign and value shows that decision driving factors influence project success positively. As the std dev value is greater than 0, so we accept the null hypothesis that path coefficient is not zero. Value of std deviation as 0.202 would represent the change in standard deviations in "Project success" for a one standard deviation change in "Decision driving factors".



Similarly for Intuitive decision making -> Project success, original sample is 0.503, sample mean is 0.506, std deviation is 0.110, T statistics is 4.577 and P value is 0.000 as shown in given below graph in my research case indicates a relationship between "Intuitive decision making" (presumably an independent variable) and "Project Success" (presumably a dependent variable). As the "Intuitive decision making" variable increases, the "Project Success" variable is expected to increase as well. If it is a standardized coefficient, the value of 0.110 would represent the change in standard deviations in "Project Success" for a one standard deviation change in "Intuitive decision making". As value of p is greater than 0.05, so we accept the hypothesis that decision driving factors have their impact on project success.



For DDs x IDM -> PS, original sample is 0.118, sample mean is 0.115, std deviation is 0.143, T statistics is 0.829 and P value is 0.407 of -0.420 in my research indicates that of no relation between the interaction term "Decision driving factors x Intuitive decision making" (presumably representing the interaction between "DDs" and "IDM" as independent variables) and "Project Success" (presumably a dependent variable). As the interaction term increases, the "Project Success" variable is expected to be having no effect, or vice versa. If it is a standardized coefficient, the value of 0.143 would represent the change in standard deviations in "Project Success" for a one standard deviation change in the interaction term "Decision driving factors x Intuitive Decision Making".

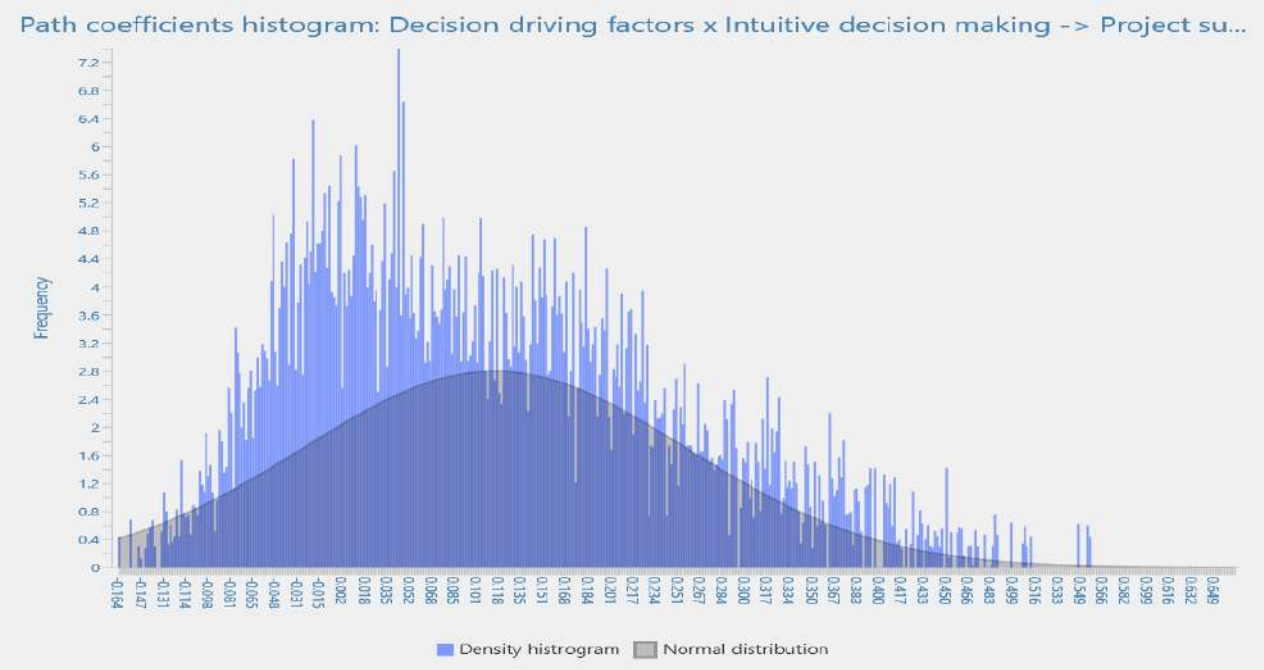
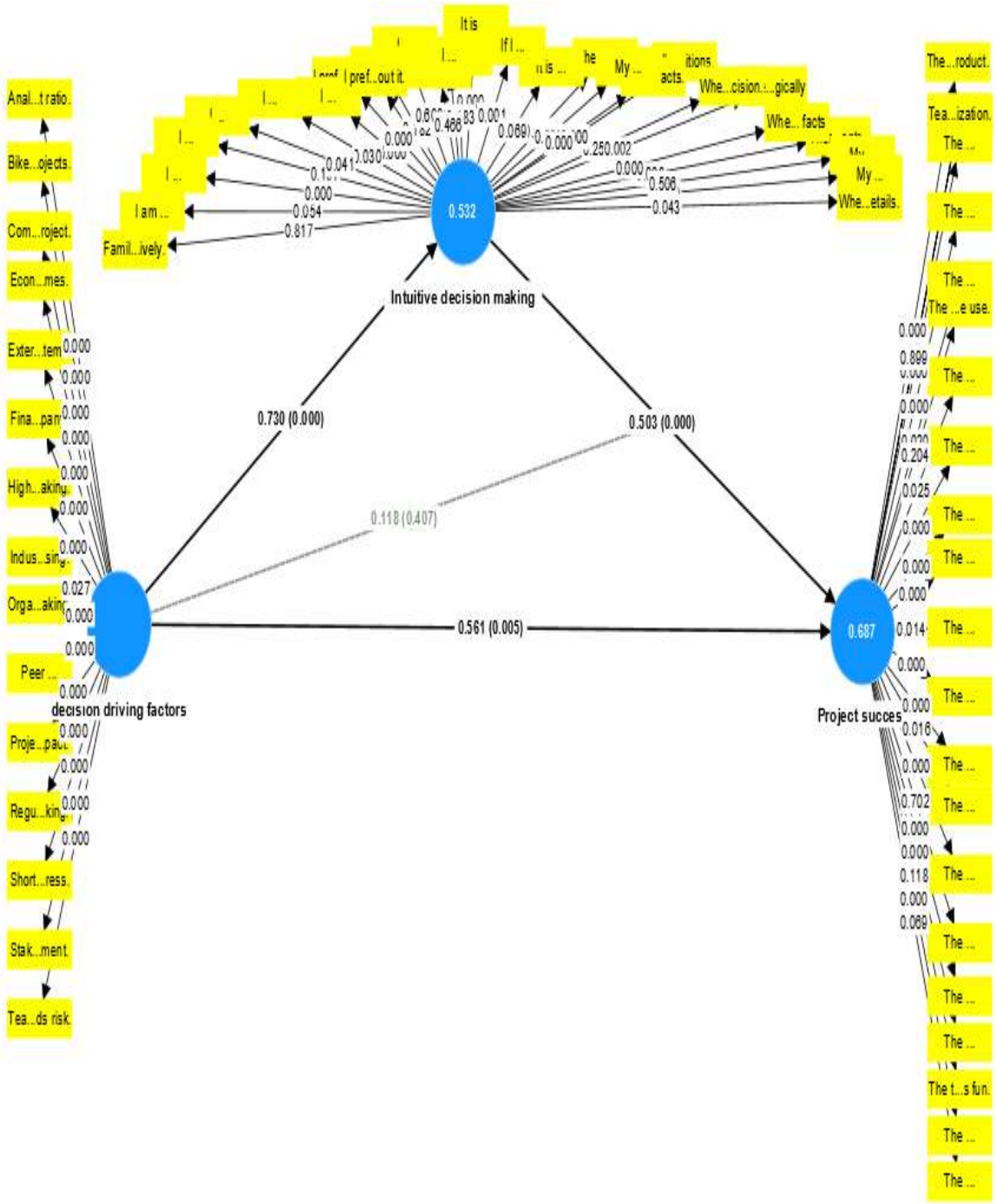


Table for Path coefficient

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Decision driving factors -> Intuitive decision making	0.73	0.738	0.041	17.619	0
Decision driving factors -> Project success	0.561	0.554	0.202	2.782	0.005
Intuitive decision making -> Project success	0.503	0.506	0.11	4.577	0
Decision driving factors x Intuitive decision making -> Project success	0.118	0.115	0.143	0.829	0.407



4.8 Multicollinearity Statistic

Multicollinearity determines the reliability of the model under study. It arises when there exists a strong statically significant relationship between independent variable of model (Daoud, 2017, December). High collinearity statistic can question the creditability of analysis result. That is why it is extremely important to check multicollinearity (Salmeron, 2018). Variance inflation factor (VIF) is widely used statistics to check the multicollinearity. VIF value less than 5.00 shows that there is no multicollinearity issue (Salmeron, 2018). Collinearity statistic of all constructs are:

	VIF
Analysis paralysis caused by benefit cost ratio.	5.461
Bike shedding on less important things rather than significant aspects of projects.	3.171
Competent individual behavior towards the important aspects of project.	2.434
Economic conditions affect project outcomes.	3.621
External stakeholder influence on project decisions in weak contractual systems.	5.062
Familiar problems can often be solved intuitively.	1.732
Financial position of the company.	2.290
Highest paid persons influence decision making.	2.421
I am a â€œbig pictureâ€□ person.	2.320
I believe in trusting my hunches	4.043
I enjoy thinking in abstract terms.	1.633
I generally donâ€™t depend on my feelings to help me make decisions.	3.944
I often make decisions based on my gut feelings, even when the decision is contrary to objective information.	3.327
I prefer concrete facts over abstract theories.	5.056
I prefer to follow my head rather than my heart.	2.849
I prefer to use my emotional hunches to deal with a problem, rather than thinking about it.	4.986
I rarely allow my emotional reactions to override logic	3.264
I rarely trust my intuition in my area of expertise.	3.986
I tend to use my heart as a guide for my actions.	1.713
I trust my intuitions, especially in familiar situations.	4.904
I try to keep in mind the big picture when working on a complex problem.	2.613
I would rather think in terms of theories than facts.	3.806
If I have to, I can usually give reasons for my intuitions.	4.210
Industrial norms impact project development to alleviate risks in projects assessing.	2.133
It is better to break a problem into parts than to focus on the big picture.	3.475
It is foolish to base important decisions on feelings.	1.838
My approach to problem solving relies heavily on my past experience	2.940
My intuitions are based on my experience.	4.895
My intuitions come to me very quickly.	2.012
Organizational Blame culture responses to decision making.	3.004
Peer review to generate the ideas.	2.912
Project timeline constraints and impact.	3.772
Regulatory constraints influence decision-making.	4.464
Shortcuts to show sense of project progress.	6.714
Stakeholder engagement.	3.544
Team members experienced personal growth.	2.254
Team members wanted to stay in the organization.	5.496
Team members' attitudes towards risk.	3.761
The customer is using the product.	4.205
The customer was satisfied.	3.275
The customer will come back for future work.	3.776
The efficiency measures were achieved.	6.708
The product improved the customer's performance.	6.129
The product met the customer's requirements.	4.273
The project contributed to new business processes.	4.248
The project created new technologies for future use.	3.055

The project developed better managerial capabilities.	1.945
The project had only minor changes.	4.328
The project has a positive return on investment.	2.596
The project increased the organization's market share.	2.504
The project increased the organization's profitability.	3.135
The project outcome will contribute to future projects.	4.318
The project team had high morale and energy.	8.451
The project team was highly satisfied and motivated.	1.795
The project was an economic business success.	3.098
The project was completed on time or earlier.	2.695
The project was completed within or below budget.	3.826
The project will help create new markets.	7.140
The project will lead to additional new products.	6.442
The team felt that working on this project was fun.	2.828
The team was highly loyal to the project.	2.468
There is a logical justification for most of my intuitive judgments.	3.857
When I have experience or knowledge about a problem, I trust my intuitions.	6.825
When I make intuitive decisions, I can usually explain the logic behind my decision.	4.349
When making a quick decision in my area of expertise, I can justify the decision logically	5.251
When making decisions, I value my feelings and hunches just as much as I value facts	3.087
When tackling a new project, I concentrate on big ideas rather than the details.	2.799
When working on a complex problem or decision I tend to focus on the details and lose sight of the big picture.	3.451
Decision driving factors x Intuitive decision making	1.000

4.9 Convergent Validity

Convergent validity also determines the quality of the instrument i.e, questionnaire in this Convergent validity "AVE" is the mean that squared factor loading of all items present in construct and its acceptable value 0.5 (Ravand, 2019) . An AVE value typically ranges from 0 to 1. In this study, AVE for Decision driving factors, Intuitive decision making, and Project success were 0.585, 0.148 and 0.186 respectively. An AVE of 0.585 suggests that more than 50% i-e 58.5 % of the variance is explained in the indicators (observed variable) and is explained by the latent construct. While AVE of 0.148 shows that only 14.8% of the variance is explained in the indicators which is less than 50% while 85.2% can be attributed to measurement error or other factors not captured by the construct and same with 0.186 respectively. Closer the value of AVE, higher is variance explained in construct suggesting good convergent validity and vice versa.

Table for Convergent validity statices for lower order construct

	AVERAGE VARIANCE EXTRACTED (AVE)
DECISION DRIVING FACTORS	0.585
INTUITIVE DECISION MAKING	0.148
PROJECT SUCCESS	0.186

4.10 Discriminant Validity

Discriminated validity analysis shows how much construct are different from each other (Ab Hamid, 2017 September). For discriminant validity, this study considers "Fornell-Larcker table ,cross-loadings and Heterotrait-monotrait HTMT matrix. The sensitivity values of Fornell-Larcker are 20.82% and

cross loadings is 0.00 (Ab Hamid, 2017 September) and (Henseler, 2015).

4.10.1 Fornell-Larcker table

Fornell-larker compares the latent construct correlation, with square root of the AVE " (Ab Hamid, 2017 September). For discriminated validity, it is curial that square root of AVE of a single of construct must be greater than correlations of another construct. In table, the values as the diagonal represent of squared AVE and it is visible that square AVEs were grater then other construct's correlations. Hence, there was no discriminated validity issue here.

Fornell-larker statistics

	Decision driving factors	Intuitive decision making	Project success
Decision driving factors	0.765		
Intuitive decision making	0.73	0.385	
Project success	0.763	0.77	0.431

4.10.2 Cross loadings

In cross Loading, the items in their present construct should be exhibit higher loading as compared to the item of another construct (Hensel et al , 2015). From the table, it is obvious that all items showed higher loading in their parent construct which is 0.4< (Goretzko, 2021).

Table for cross loading

	Decision driving factors	Intuitive decision making	Project success
Decision driving factors	0.765		
Intuitive decision making	0.73	0.385	
Project success	0.763	0.77	0.431

4.10.3 Heterotrait-monotrait (HTMT) matrix

HTMT in the superior method for analysis discriminated validity with highest sensitivity and specificity value, i.e, 97% to 99% (Ab Hamid, 2017 September). If HTMT values are greater than 0.90, it can cause discriminated validity issue. According to some literature, the HTML value should be less than 0.85 to avoid discriminated issue (Yousaf et al., 2020) the HTMT matrix in the table show that there were to discriminated validity issue as all the values were less than 0.9.

Table for Heterotrait-monotrait criterion

	Decision driving factors	Intuitive decision making	Project success	Decision driving factors x Intuitive decision making
Decision driving factors				
Intuitive decision making	0.642			
Project success	0.739	0.859		
Decision driving factors x Intuitive decision making	0.878	0.587	0.587	

4.11 Higher order construct validation

In this study, decision driving factors were higher order to construct that were derived from five factors i.e, external project factors, internal project factors, social differences, personal biasness and time pressure. The higher order construct model is pictured in the figure, and it involves bootstrapping to check the validity. Bootstrapping is a "nonparametric test" that analyzes the correlation between the construct by creating subsample (Latan, 2017) . PLS sports up to 10000 subsamples, but this study used 5000 subsample to speed up the analysis process. It randomly draws sample from the original data set and iterates it to generate simulated dataset (Wood, 2004)

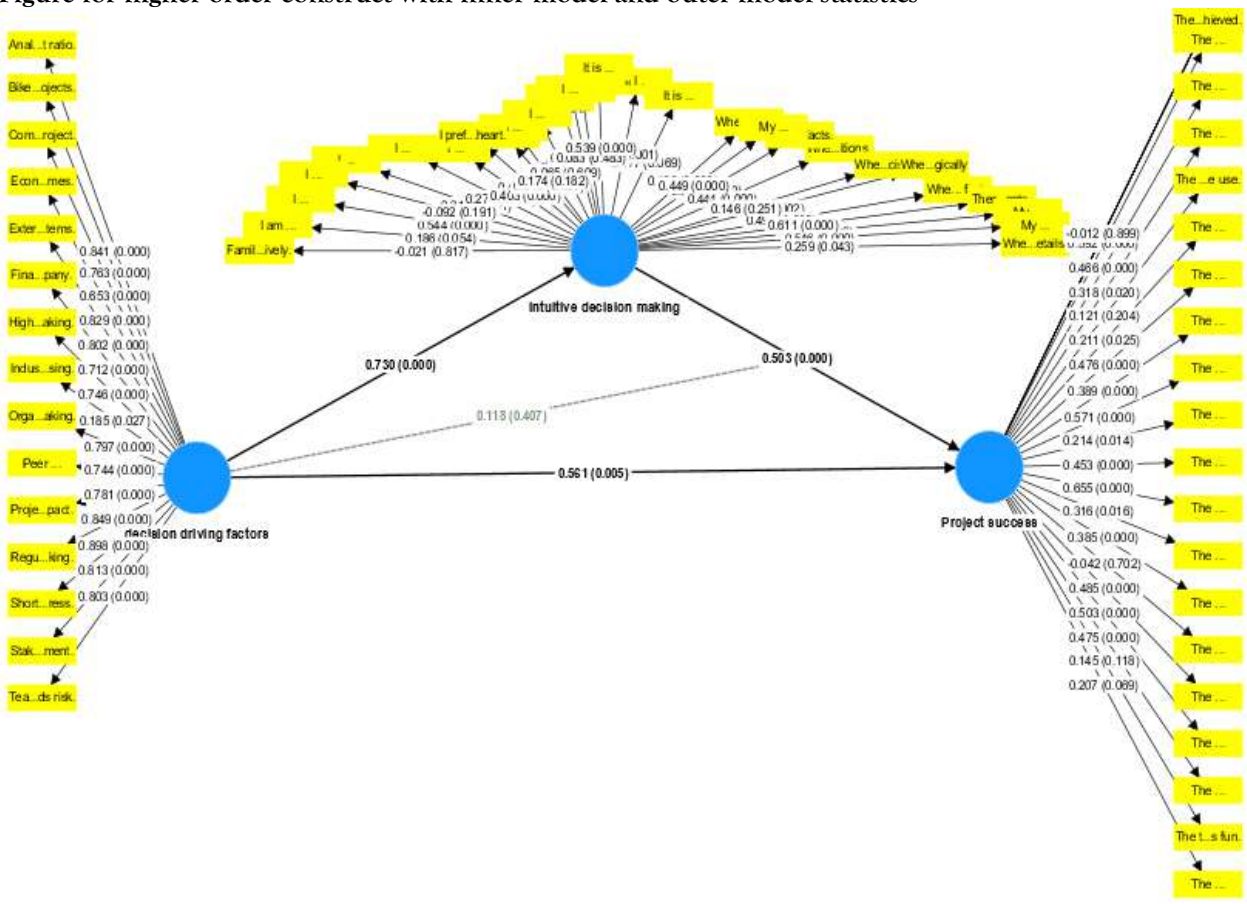
Table for cross loading for lower order validation

	Decision driving factors	Intuitive decision making	Project success	Decision driving factors x Intuitive decision making
Analysis paralysis caused by benefit cost ratio.	0.841	0.6	0.659	-0.787
Bike shedding on less important things rather than significant aspects of projects.	0.763	0.623	0.553	-0.653
Competent individual behavior towards the important aspects of project.	0.653	0.579	0.62	-0.583
Economic conditions affect project outcomes.	0.829	0.646	0.688	-0.751
External stakeholder influence on project decisions in weak contractual systems.	0.802	0.561	0.532	-0.589
Familiar problems can often be solved intuitively.	-0.085	-0.021	-0.108	0.121
Financial position of the company.	0.712	0.559	0.505	-0.619
Highest paid persons influence decision making.	0.746	0.475	0.566	-0.641
I am a â€œbig pictureâ€ person.	0.08	0.186	0.12	0.048
I believe in trusting my hunches	0.451	0.544	0.352	-0.439
I enjoy thinking in abstract terms.	-0.123	-0.092	-0.104	0.097
I generally donâ€™t depend on my feelings to help me make decisions.	0.327	0.314	0.027	-0.382
I often make decisions based on my gut feelings, even when the decision is contrary to objective information.	0.339	0.279	0.333	-0.225
I prefer concrete facts over abstract theories.	0.378	0.403	0.193	-0.222
I prefer to follow my head rather than my heart.	0.261	0.485	0.224	-0.252
I prefer to use my emotional hunches to deal with a problem, rather than thinking about it.	0.394	0.549	0.534	-0.419
I rarely allow my emotional reactions to override logic	0.113	0.174	0.227	-0.151
I rarely trust my intuition in my area of expertise.	-0.053	0.065	-0.016	0.033
I tend to use my heart as a guide for my actions.	-0.039	-0.068	-0.123	0.113
I trust my intuitions, especially in familiar situations.	0.515	0.612	0.398	-0.606
I try to keep in mind the big picture when working on a complex problem.	0.067	0.083	-0.046	-0.081
I would rather think in terms of theories than facts.	0.407	0.531	0.538	-0.347
If I have to, I can usually give reasons for my intuitions.	0.499	0.306	0.212	-0.28
Industrial norms impact project development to alleviate risks in projects assessing.	0.185	0.114	0.156	-0.094
It is better to break a problem into parts than to focus on the big picture.	0.204	0.539	0.258	-0.22

It is foolish to base important decisions on feelings.	0.117	0.177	0.214	-0.135
My approach to problem solving relies heavily on my past experience	0.078	0.449	0.257	-0.07
My intuitions are based on my experience.	0.221	0.546	0.345	-0.441
My intuitions come to me very quickly.	-0.044	-0.076	-0.165	0.046
Organizational Blame culture responses to decision making.	0.797	0.536	0.671	-0.691
Peer review to generate the ideas.	0.744	0.574	0.528	-0.667
Project timeline constraints and impact.	0.781	0.496	0.589	-0.696
Regulatory constraints influence decision-making.	0.849	0.559	0.584	-0.651
Shortcuts to show sense of project progress.	0.898	0.654	0.731	-0.756
Stakeholder engagement.	0.813	0.576	0.568	-0.728
Team members experienced personal growth.	0.045	0.001	-0.012	0.071
Team members wanted to stay in the organization.	0.369	0.502	0.703	-0.271
Team members' attitudes towards risk.	0.803	0.601	0.59	-0.726
The customer is using the product.	0.332	0.269	0.394	-0.144
The customer was satisfied.	0.61	0.42	0.616	-0.469
The customer will come back for future work.	0.373	0.534	0.483	-0.456
The efficiency measures were achieved.	0.339	0.284	0.488	-0.098
The product improved the customer's performance.	0.367	0.374	0.592	-0.151
The product met the customer's requirements.	0.274	0.458	0.466	-0.395
The project contributed to new business processes.	0.194	-0.002	0.318	0.013
The project created new technologies for future use.	0.028	0.153	0.121	0.104
The project developed better managerial capabilities.	0.11	0.059	0.211	0.007
The project had only minor changes.	0.608	0.399	0.476	-0.614
The project has a positive return on investment.	0.39	0.117	0.389	-0.268
The project increased the organization's market share.	0.357	0.531	0.571	-0.259
The project increased the organization's profitability.	0.108	0.021	0.214	0.064
The project outcome will contribute to future projects.	0.296	0.391	0.453	-0.208
The project team had high morale and energy.	0.411	0.447	0.655	-0.347
The project team was highly satisfied and motivated.	0.27	0.301	0.316	-0.466
The project was an economic business success.	0.346	0.276	0.385	-0.503
The project was completed on time or earlier.	0.066	-0.033	-0.042	-0.087
The project was completed within or below budget.	0.452	0.245	0.485	-0.394
The project will help create new markets.	0.331	0.196	0.503	-0.213
The project will lead to additional new products.	0.286	0.611	0.475	-0.477
The team felt that working on this project was fun.	0.19	0.068	0.145	0.006
The team was highly loyal to the project.	0.196	0.227	0.207	-0.21
There is a logical justification for most of my intuitive judgments.	0.277	0.611	0.49	-0.425
When I have experience or knowledge about a problem, I trust my intuitions.	0.301	0.444	0.301	-0.478
When I make intuitive decisions, I can usually explain the logic behind my decision.	0.043	0.146	0.11	-0.069
When making a quick decision in my area of expertise, I can justify the decision logically	0.342	0.482	0.493	-0.444
When making decisions, I value my feelings and hunches just as much as I value facts	0.117	0.494	0.33	-0.22
When tackling a new project, I concentrate on big ideas rather than the details.	0.355	0.259	0.113	-0.16

When working on a complex problem or decision I tend to focus on the details and lose sight of the big picture.	0.344	0.433	0.389	-0.328
Decision driving factors x Intuitive decision making	-0.864	-0.751	-0.672	1

Figure for higher order construct with inner model and outer model statistics



To check model validity, first step is to establish outer weights and outer loadings. The above figure shows that most of the weights were significant, ie., max T stats were green and greater than 1.4. Furthermore, most of the outer loadings were greater than 0.5 and most of the VIF values were less than 5 except a few. So, the corresponding indicators with less VIF value of relevant variable indicated low multicollinearity. It also suggests that corresponding variable don't strongly correlate with other predictors of model. However, model is considered as valid and there is no as such issue in higher order construct as the overall values of all variables are less than 5.

	Decision driving factors	Intuitive decision making	Project success	Decision driving factors x Intuitive decision making
Decision driving factors		1	4.199	
Intuitive decision making			2.44	
Project success				

Decision driving factors x Intuitive decision1making			4.511	

4.12 Correlation analysis

Correlation analysis is used to check the relation between independent variable (IV), dependent variable (DV), mediating variable (Me), and moderating variable (MV). This analysis provides pivotal ground for hypothesis testing aimed as ultimate goal of this research. This method is used to determine the direction of relationship between the variables i-e whether it is positive or negative. Furthermore, this method is also used to determine the strength of relationship between variables i-e strong, moderate, or weak. In my research, Pearson correlation coefficient (r) was checked to determine correlation between variables. The range of r is from -1 to +1. If relation between variables is positive, value of r is positive whereas if relation between variables is inverse, then value of r is negative. According to (Riaz Ahmad, 2022), the value of Pearson correlation coefficient has certain brackets to show. If the value of r is more than 0.5, the relation is said to be strong. If the value of r is somewhere between 0.3 to 0.5, the relation between variables is moderate. And if the value is less than 0.3, then the existing relation between variables is weak. Table mentioned below shows the results of descriptive analysis of latent variables in our research. Path coefficient is used to represent the weights or coefficients assigned to paths connecting variables in structural model.

Results of correlation analysis of variables in lieu of our research is given in following table.

Table for correlation analysis

	Decision driving factors	**Intuitive decision making**	**Project success**	**Decision driving factors x Intuitive decision making**
Decision driving factors	1	0.73	0.763	-0.864
Intuitive decision making	0.73	1	0.769	-0.751
Project success	0.763	0.769	1	-0.672
Decision driving factors x Intuitive decision making	**-0.864**	**-0.751**	**-0.672**	**1**

Correlation analysis confirms following three things:

a) Does the relation exist between the variables?

b) Is the existing relation positive or inverse?

c) Strength of the relation whether it is strong, moderate or weak?

And lastly, project success has moderate positive correlation with product of decision driving factors and intuitive decision-making process.

4.12.1 Correlation between decision driving factors and intuitive decision-making process

In my research, results if correlation of latent variables in our study show that decision driving factors have comparatively strong positive correlation with intuitive decision-making process (r=0.0.73)

4.12.2 Correlation between intuitive decision-making process and project success

Intuitive decision-making process has comparatively positive correlation with project success (r=0.769).

4.12.3 Correlation of intuitive decision-making process between decision driving factors and project success

Intuitive decision-making process has value of positive strong correlation of -0.672 with product of decision driving factors and intuitive decision-making process ie,- mediation of intuitive decision making between project success and decision driving factors

4.12.4 Correlation between decision driving factors and project success

In my research, results correlation of latent variables in our study show that decision driving factors have

strong positive correlation with project success (r=0.763)

4.13 R-square test

It is actually coefficient of determination which is used to measure the proportion of variance in the dependent variable (endogenous variable as project success and intuitive decision making) which is actually explained by the independent variable (exogenous variable as decision driving factors). This test actually aims to assess the goodness of fit of the model. Its value ranges from o-1 whereas the higher value indicates better fit.

In our research, after performing bootstrapping in PLS SEM, the values obtained are in given table where original sample (coefficient of determination) referred to R^2 of 0.435 for intuitive decision making suggests that 43.5% of variance in endogenous variable (Intuitive decision making) is explained by exogenous variable (Decision driving factors) of our model and sample mean is mean of intuitive decision making. Model seems to have low P value making model as statistically significant. Standard deviation is amount of dispersion or variation which is 0.047 for intuitive decision making which is very close to p value (or simply the predicted value in case of regression). P value of 0 is showing extremely strong evidence against null hypothesis which implies that the above result is highly unlikely to occur randomly. So, our model in this case is highly significant.

Similarly, the same goes with project success which is expected to be 64.7% explained by decision driving factors. P value of 0 suggesting strong evidence against null hypothesis. So both variables are showing moderate regression. Our data of research qualifies the R square test with their respective values as mentioned in following table.

Table for R^2 test statistics

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Intuitive decision making	0.435	0.438	0.047	9.228	0
Project success	0.647	0.651	0.044	14.813	0

4.14 F-square test

It is also known as F-statistic which is used to assess the overall statistical significance of regression model. It tells us to determine whether a model is best fit to data than a model with no predictor. Removing exogenous variable ie decision driving factors from our model can affect endogenous variable, ie project success and intuitive decision making. F-Square is actually change in R-Square value when an exogenous variable is removed from model. It is actually effect size whose value as >=0.02 is considered as small, >=0.15 is medium and >=0.35 is considered as large (Swinton, 2022).

In case of regression of intuitive decision making on decision driving factors in our research, regression coefficient of 0.769 indicates that for one unit increase in decision driving factors, there is 0.769 unit increase in endogenous variable (intuitive decision making) statistically high regression. Standard deviation provides the information about variability of our data observed in intuitive decision making. P value of o suggests strong evidence about rejecting Null hypothesis. Or in other words, it suggests that decision driving factors are statistically significantly associated with intuitive decision making. Whereas T value shows how many standard deviations the coefficient from zero. In our case, t value of 4.918 is relatively high indicating difference of coefficient from zero.

Likewise, all other regression coefficients provide us relatively medium and strong regression with respective P values and thus qualifying the F square test as shown in table below

Table for F-square statistics

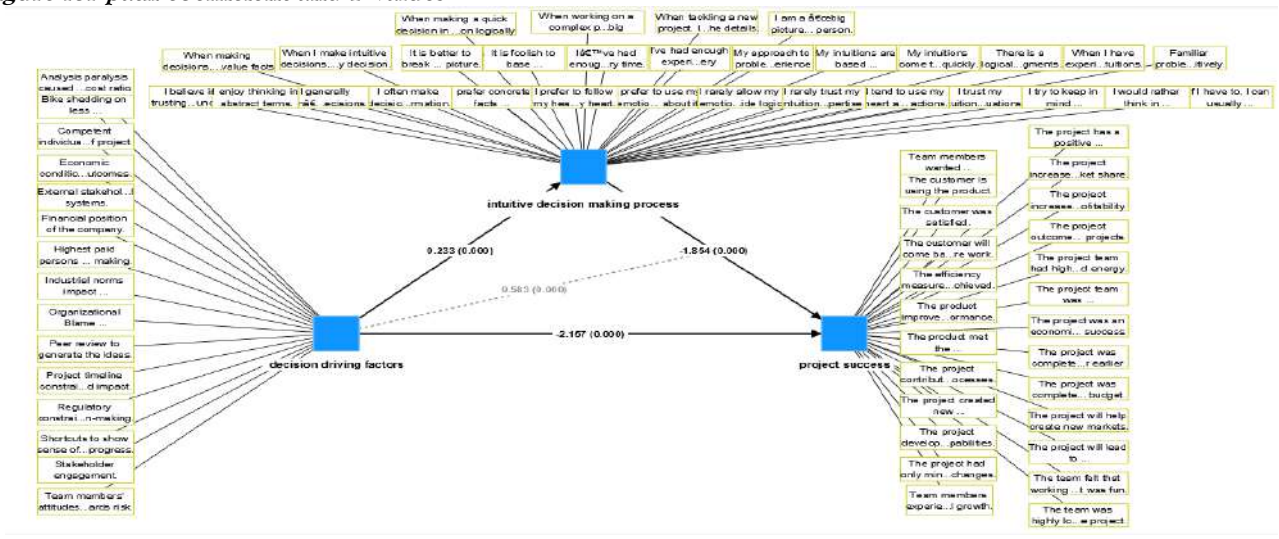
	Original sample	Sample mean	Standard deviation	T statistics (|O/STDEV|)	P values

	(O)	(M)	(STDEV)		
Decision driving factors -> Intuitive decision making	0.769	0.792	0.156	4.918	0
Decision driving factors -> Project success	0.182	0.18	0.078	2.326	0.02
Intuitive decision making -> Project success	0.178	0.179	0.081	2.194	0.028
Decision driving factors x Intuitive decision making -> Project success	0.233	0.23	0.089	2.621	0.009

4.15 Hypothesis results

The main reason to undertake this endeavor is to check the relationship between decision driving factors and project success while taking intuitive decision making process as mediating variables and decision driving factors as moderating variables as well. Whereas path coefficient represents strength and direction of relationship between two constructs, T-statistic assess statistical significance of path coefficient. P-value above than 1.96 at 5% significance level indicated statistical significance and a higher absolute t-value shows significant relation (Swinton, 2022). P-value less than 0.05 suggests that we can reject the null hypothesis as it is strong evidence to reject null hypothesis and vice versa (Swinton, 2022). This study was conducted to study five hypothesis, and then to check the relationship between decision driving factors (independent variable), project success (dependent variable), f-square test was conducted. To find relation between intuitive decision-making process (mediating variable) through moderation mediation model, path analysis and R-square test was used and to validate results internally, bootstrapping analysis was used for reliability. The results of tests applied for each hypothesis are as follow:

Figure for path coefficient and P-values



4.15.1 Decision driving factors and intuitive decision making

H1: *Decision driving factors have significant impact on intuitive decision-making process.*

H1 assessed the relation between decision driving factors and intuitive decision making process whose results revealed that β = 0.330, P-value=0.00,coefficient of regression r=0.769, and T statistics =4.918. So H1 is supported.

4.15.2 Intuitive decision making process and project success

H2: *Intuitive decision making process has significant impact on success of oil and gas complex projects.*

To test whether intuitive decision making impact project success at first, R-square test from quality criteria of Smart PLS 4 is conducted whose results are shown in given table.

We have found correlation matrices and basic descriptive statistics using exploratory data analysis. I used Smart PLS 4 to calculate path coefficients representing the strength and direction of the relationships. Further to assess the model fit, R-Squared test is performed using bootstrapping to validate the significance of path coefficients. The t-statistic is used to test whether the R^2 value is significantly different from zero. If the t-statistic is significantly different from zero, it suggests that the model, as represented by the R^2, has statistically significant explanatory power. Further F square test was conducted to test hypothesis the results are β= -1.854,T statistic= 4.328, and p=0.000 show medium positive impact of intuitive decision making on project success and T statistics =2.194 showing explanatory power of model. So H2 is supported.

4.15.3 Decision driving factors and project success

H3: *Decision driving factors significantly impact the success of oil and gas complex projects.*

In light of the mentioned above studies, our research results for hypothesis denoted by H3 are as follows;

β =-2.157, T= 4.561, and P-value = 0.000, show that decision driving factors have negative strong impact

on project success. Negative sign shows negative which means if less is value of decision driving factors, there will be more chances of project success and vice versa. Thus, based on results, we can conclude that H3 is supported.

4.15.4 moderation analysis

H_4: *Decision driving factors significantly moderate the relationship between intuitive decision making process and project success.*

In light of the mentioned above studies, our fourth hypothesis denoted by H4 is as follows:

β =0.583, T statistic=5.206, and P-value= 0.000 from above mentioned figure show that there is medium moderation of decision driving factors between intuitive decision making and project success. So based on results of conducted tests, hypothesis No 4 is supported.

4.15.5 Mediation analysis

H_5: *Intuitive decision making significantly mediates the relationship between decision driving factors and project success.*

Results reveal that intuitive decision making process significantly partially mediates the relationship between decision driving factors and project success i.e. p-value= 0,023, β=0.18. Total direct effect between decision driving factors and project success was not significant as p-value is greater than coefficient of determination. While total indirect was also significant. Thus, with the inclusion of intuitive decision making as mediator, total direct effect became significant as having p= 0.023, and β=0.18. thus, H5 is supported

Total indirect effect **Decision driving factors -> Project success**				**Total effect** **Decision driving factors -> Project success**			
Coefficient of determination	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Coefficient of determination	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
0.098	0.043	2.266	0.023	0.22	0.146	1.505	0.132

Indirect effect **Decision driving factors -> Intuitive decision making -> Project success**			
Coefficient of determination	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
0.098	0.043	2.266	0.023

Chapter: 5 Discussion and conclusion

In the past, only technical competencies and statistical methods were used in decision making and considered as most important characteristics for successful completion of complex projects (Farell, 2023). Recent study emphasizes a lot on intuitive decision making process taken by experienced project managers as one of the type of cognitive processes for efficient decision making process in especially front lines of complex oil and gas projects in Pakistan to make it best possible successful completion of projects. There has been extensive research on statistical decision making based on only tools to be used for assessing impacts of possible facts on projects success but only a little is literature available on decision driving factors in literature (Ama Lawan, 2023). While this study aimed to give a brief sketch about different driving factors for decision making processes as well as intuitive decision making process to avoid time losses and making projects success while making efficient use of scarce natural as well as physical and financial resources (Amjad, 2021).

5.1 Introduction

In this study, we had five factors of decision drivers as independent variable (exogenous variable) as well as moderating variable, intuitive decision making as one of the type of cognitive process (JC, 1978) considered as mediating variable, and project success as dependent variable (endogenous variable). Thus, we had moderation mediation model No 74 of Hayes statistical process for research. 339 participants i.e. both male and female project managers participated in our study. items for decision driving factors were created through specific process of nine steps which were refined, deleted and validated though experts. Then responses from participants for three variables were collected.

5.2 Discussion and main findings

We conducted different analysis tests including cronbach alpha test, higher order construct, overloading, R square test and F square test. Based on the results of different tests, we assessed our hypothesis and conclusions were made based on the results. Higher the value f drivers, higher will be intuitions in decision making. Results reveal that decision driving factors have significant impact on intuitive decision making process supporting H1.

Intuitive decision making process has medium impact on project success as results β= 0.295, p=0.021 reveal that if $0.30<\beta<0.15$, there will be medium effect (Swinton, 2022). More will be intuitions more will be the chances of project success. Thus, supporting H2.

Decision driving factors show no impact on project success as β =0.123, P-value = 0.271 from results reveal that coefficient is smaller than P- value. Thus, H3 is not supported.

Similarly in case of moderation analysis results as β =0.123, P-value = 0.271 from tests reveal that decision driving factors don't have any impact on relation between intuitive decision making process and project success. Decision drivers don't play any role in moderation of relation. Thus, H4 is not supported.

While mediation analysis reveals that intuitive decision making process mediates between decision driving factors and project success showing medium effect as p= 0.023, and β=0.18 in which $0.30<\beta<0.15$ (Swinton, 2022). Thus, H5 is supported.

5.2 Implication

Our research has a lot of theoretical and practical implications in the field of project management and fills the gap defined by prior studies in literature. It provides a deeper comprehension of intuitive decision making and problems noted by OGDC companies. The industrial sector of Pakistan will benefit from the adoption of intuitive decision making by making it easier to set goals for improving the project performance of businesses. Moderating role of decision driving factors also be studied between intuitive decision making process and project success as well as impact of decision driving factors on intuitive decision making process gives deep insight in specific context. The study will also help to apply more precise and reliable techniques for reducing the frequency of errors pertaining to decision making process which in turn cause the project failures. Results of moderation of decision

driving factors on the relationship between intuitive decision making process and project success as well as impact of decision driving factors on intuitive decision making process (mediated moderation model) will help to understand that how important is incorporation of decision driving factors for successful completion of project. A project can be delayed or failed if experts don't take decisions by matching them to their past experience to draw effective, fast results as many decisions in complex projects need to be relatively quickly because it costs for every extra resource and time which impedes project success.

If the project completes within scope, time and cost, then it becomes advantageous with respect to its competitors which helps the companies to gain more market share comparative to its competitors (there has been competition in oil and gas industry after oil prices shock in 2007-2008). No such study aimed at exploring the relation between intuitive decision making process and project success with moderating role of decision driving factors. The study undertaken will contribute to the Management Sciences and Project Management disciplines in the context of developing and validating decision driving factors scale through exploratory factor analysis (EFA), relation of these drivers with intuitive decision making in complex projects of oil and gas industry project success and intuitive decision making process (mediated moderation model) in many ways: this study also addressed the limitations and research gaps earlier or previous studies identified by different researchers. Therefore, this study will also be a useful contribution to the literature and theory along with practitioner's side. The study has practical significance as the recommendations and suggestions that would be applied on complex projects in oil and gas industry to help the management of projects in better decisions undertaken for projects success.

5.2.1 Theoretical implication

To begin with, we utilized the theory of choice while taking decisions in oil and gas projects conceiving the success of projects. We have used intuitive decision making process as a type of cognitive process mentioned in research literature (Ama Lawani, 2023). We have made an attempt to create items for decision driving factors. We conducted research on impact of decision driving factors on project success and intuitive decision making process. Research revoked significant work researching on decision driving factors on project success and intuitive decision driving factors (Farell, 2023). This model covers methodological gap by taking studies on mediation moderation model for construct and this model have not yet been studied. This study adds knowledge to the literature as decision driving factors have not been studied yet and cognitive processes have also not yet been studied in the field of project management. This study focuses on implications of decision making on projects success in the field of project management. This study fills the gap left by prior studies in the field of critical project success in respect of intuitive making process (Farell, 2023) and confirms that this cognitive process deepens our understanding of relationship between aforesaid variable and project success along with influence of decision drivers. Moreover, our findings reveal the underlying mechanism linking to decision making and project success.

5.2.2 Practical implication

This study can help experienced project managers and field experts to understand the importance of intuitive decision making process while taking crucial decisions to enhance project success. It helps oil and gas project managers to understand the impact of different decision driving factors on intuitive decision making. This study enhances the culture of effective decision making as project managers of oil and gas projects in Pakistan are affected by different types of above mentioned drivers in their decisions to project goals. It will enhance effective utilization of resources in oil and gas projects in Pakistan to make effectiveness of economic price effect. This study also helps project managers to understand choice theory when they are in a position of having different options keeping after effects under consideration.

5.2.3 Policy implication

After conclusion of results obtained from different tests on our research, we suggest some specialized training programs for decision makers and project managers in oil and gas industry. Oil and gas industry should include module of intuitive decision making process to ensure individuals involved in complex projects have skills to make timely and effective decisions. Oil and gas industries should encourage intuitive decision making process as recognized and valued project management aspect. Develop guidelines to include intuitions in decision making process to combine analytical and intuitive thinking to promote holistic approach. Industries should promote policies to access easily for intuitive decision making. Industries should encourage and propose policies to development and implementation of robust risk management strategies. Individuals of projects should be acknowledged about inherent uncertainties of complex projects making individuals being able to face dynamic situations. Recommend policies that support post-project reviews, encouraging organizations to capture lessons learned and incorporate them into future decision-making processes. Different regulatory bodies should be encouraged to work collaboratively with industry stakeholders to develop adaptive frameworks that support effective decision making environments. These are some proposed policy implications aimed to enhance decision making process in oil and gas industry based on the results of our research.

5.3 Limitation of the study

- The study was carried out only in oil and gas industry and may not generalize to other industries with different regulations and decision making process.
- The study focuses only on mediating role of intuitive decision making process between decision driving factors and project success. Other variables such as team competency, project complexity, other cognitive process types of team effectiveness can also play role on project success.
- As it is cross sectional study which allowed the study to be concluded on shorter schedule as compared to longitudinal study which needs time and may produce different outcomes.
- As this study considered past ten years project, which may limit the findings of our study.
- We had very limited time to access to certain projects data and very hectic schedule to collect responses from key stakeholders.
- The oil and gas industry are diverse, and the success factors for complex projects may vary based on the specific nature of projects (e.g., exploration, production, refining) and this study undertook all the mentioned three sectors.

5.4 Future research directions

- In order to get generalizability of results, this study can be extended to other industries and countries. This will help to find out whether the findings are specific to oil and gas industry or are applicable to more widely industries.
- Furthermore, inclusion of other variables such as naturalistic decision making process, statistical decision making process, team competency, project complexity, project performance, and project constraints can provide a more comprehensive understanding of effective decision making for projects success.
- Qualitative research may be carried out for exploratory purpose to get deep insights to our research.
- Future research may be carries out with limited sample size to assess specific context of oil and gas industry to find applicability of results.
- As oil and industry is diverse, so future studies can be conducted on specific nature of projects ,i.e. exploration, production, or refining.

5.5 Conclusion

- The findings shed light on key factors influencing project success and underscore the significance of both analytical and intuitive approaches in navigating the challenges inherent in this dynamic sector.
- While the study contributes valuable insights, it is essential to acknowledge its limitations, such as sample size constraints, subjectivity in assessing intuitive decision-making, and potential temporal considerations. These limitations highlight areas for future research refinement and underscore

the need for ongoing exploration as the industry continues to evolve.

- The policy implications derived from this research aim to foster a conducive environment for effective decision-making in the oil and gas industry. By promoting training programs, encouraging transparency, and advocating for adaptive regulatory frameworks, these recommendations strive to enhance project outcomes and contribute to the resilience of organizations in the face of complex challenges.

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