

Impact of Commercial Decision Making in the Cost at the Pre-Tendering Stage

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Research Article

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Abstract

The Indian construction industry has the cognitive frame of operating in the cost-based approach rather than the value-based approach, and the project process and strategies are framed in such a manner to increase the profitability of the project by the organization. Nevertheless, the profitability margin of the construction project is very comparatively low compared to the other Industrial sectors. There is much reason for not attaining a higher profitability margin in the construction sector. Some of the reasons are the low innovative business plan, ineffective data-driven decision-making, ineffective management of the transaction, and construction risks.

The responsibilities of increasing profitability and managing the transactional flow in the project are given to the commercial manager. The roles and responsibilities of the commercial manager vary globally. The quantity surveyor's job role further enhanced the commercial manager, where the latter can take the commercial decisions about the project.

This research paper's primary outcome is the framework model for making effective decisions by the commercial manager, which increases the project's profitability. The systematic decisions, which are made in the projects by the commercial manager are studied. Considering the external factors like the COVID-19 outbreak, market condition, and existing factors affecting the decision-making process, the tools and techniques for making efficient decisions in the construction project are suggested. The synergies between these tools and techniques are studied, and a decision-making model is framed to reduce the cost and time overrun, and the benefits associated with implementing the model in the project are detailed.

Introduction And Background

The Indian construction industry records the lowest profit percentage compared to all other sectors even though the construction sector has a cognitive framework of the industry works in a cost-based approach rather than the value-based approach. The Indian construction sectors operate in urban development, infrastructure, ports, water supply, and building work on EBIDTA margins of 10 %, where the net profit margin is 2 to 4 %. The lowest profit percentage bounds with many reasons like negative cash flow, the rising interest cost, ineffective management, low commodity price.

The ineffective management of construction projects is one area where optimization can be brought easily by endorsing the benefits associated with the change of new technology, new framework in the more fragmented Indian construction industry. The Indian construction industry is another cognitive framework and the institutional actor of the construction company of strategic benchmarking of the successful company and their winning strategy. So, the Industrial leading company should focus on effective management of the project to increase profit, which benefits all stakeholders and changes the nature of how the industry works.

Since the construction project success rate mainly evolves around the profit rate, effective monitoring and control of the project should be needed. Separate skills and competencies are needed to create an effective organization's effective function to make a profit.

The job role "commercial manager" gained much attention in the Construction Industry, where the traditional role of quantity surveyor evolved into the commercial manager. The standard definition of commercial management evolves around the construction industry is "Looking after the profits of the company, by keeping costs to a minimum and maximizing income" (al, 1997).

Based on the survey, the commercial decision made by the commercial manager is studied for commercial and residential projects. The decision-making process and effectiveness to improve the profitability of the project are studied in the research. The COVID-19 Pandemic has changed decision-making by adding more external factor constraints affecting the successful completion of the projects.

The primary outcome of the research appears to suggest a commercial decision-making framework, which increases the profitability of the project. By understanding the factors of the decision-making process in the various stages of construction projects, effective decision-making tools and techniques are suggested. The professional industry input about the decision-making framework is received by conducting an interview and survey. The hypothesis condition is framed and tested, whether the framework could be effective and benefits all the different levels of size, the complexity of the construction project.

The synergy between the tools and techniques suggested is studied, and the more appropriate framework by understanding the benefits of integrating the tools and techniques for making an appropriate commercial decision that would increase profitability by decreasing the time and cost overrun and optimizing the construction process is suggested. The SWOT Analysis for the framework is framed for understanding the future opportunities of extending the research further.

1.1 Aim

To recommend effective decision-making tools and technique to increase profitability in the construction projects

1.2 Research Gap

The research questions are framed based on the research gap, and the research primarily focused on answering the following questions

- 1.What is the primary role of the commercial manager in the Indian construction Sector?
- 2.What is the Impact of Commercial decisions made in respect of the cost?
- 3.What are the tools and techniques available and synergies between them in the decision-making process?

4. What are the effective tools and techniques to increase the project's profitability, considering the synergies between them?

1.3 Limitation of the research

1.4 Objective

1.4.1 To study the roles and responsibilities of the commercial manager in the Indian Construction Sector

1.4.2 To analysis, the commercial decision made at the Pre-tendering stage and identify the impact of decision making from the cost– Employee perspective

1.4.3 To study the evolution of the decision-making process after COVID-19

1.4.4 To recommend effective tools and strategies for decision making to increase the profitability of the project

Methodology

2.1 Approach

The research methodology is the Inductive research approach or Bottom-up approach. Inductive research is generating a hypothesis and developing a theory or framework.

Reason for choosing the Inductive research approach:

There is no theory or framework on the decision-making process that would increase profitability. So, the detailed observation of the decision-making process and its impact on the cost is studied. The initial preliminary hypothesis is made to establish a relationship between cost and decision-making. Various data collection processes establish the data-driven decision-making framework, and they adaptable in the real market is studied.

2.3 Flowchart of research Methodology

The research method and data collection on the research are explained in the previous section. The flowchart of research explains how the objectives of the research are to be achieved.

Objective 1

The initial literature review for understanding the roles and responsibilities of commercial managers in the larger world context is studied. The areas and processes the commercial manager involved majorly are selected as the attributes for the following study of the research. The commercial manager is involved

in the preconstruction stage and posts the construction stage like Contract Negotiation, Procurement strategy, Business Plan Development, acquiring approvals and permits, Supply chain management, Contract Management, Compliance Management, Cost management. The attributes are more than 20, and to concrete only on the Indian construction sector and the critical roles the industrial professional involved, primary data collection is carried out.

The initial pilot survey is designed and circulated to select the initial attributes for the Analytical hierarchy process. The essential attributes of 10 numbers are selected. The Analytical hierarchy process for the ten attributes is done by framing an AHP specially designed Questionnaire. The AHP helps to find suitable attributes based on relative importance and helps to understand the problem. The importance of the attributes is measured in the number and ability to decide by allowing a straight ward consideration of the course of the action. Objective 1 is attained.

Objective 2

The literature review and the market analysis are done to study the commercial decision made at the selected process by the commercial manager. The impact of the commercial decision made by the commercial manager on the cost is studied

The hypothesis condition is established between the variable cost and the decision for the selected process to find the interdependencies between the two variables. If the null hypothesis got rejected, new attributes are selected, and the impact study is done for them.

Objective 3

The impact of decisions made in the process and how the decision-making process changed by the COVID-19 Pandemic is recorded with the interview and market analysis for the selected process.

Objective 4

Effective decision-making tools and techniques are founded, and synergy between them is established. A framework for the effective decision-making process for commercial decisions is framed. The objective of the framework is formed as a statement. The agreement of the Statement by the industry professional and feedbacks are recorded by the Likert scale survey and questionnaire.

Discussion And Suggestion

The commercial decisions made at the cost management, risk management, contract formulation, performance management, and value management are studied by interviewing with the commercial managers and thorough literature review. Through the hypothesis testing the relationship between the

decision made and the project, the cost is established by getting the agreement of the commercial manager. Since the 28 attributes decision points relationship between the project cost is established statistically, its impact on the project cost is discussed in the following section.

4.1 Commercial Decision making and its impacts

4.1.1 Decision checkpoints for Cost Management

Table 1 Impacts study on the Cost Management decision checkpoints

Commercial Decision points	Impacts
<p>Selecting the cost control tools, the payment type -Based on the cost certainty, time and scope certainty, risk, and detailed measurement available, the type of cost control and payment mechanisms are chosen.</p>	<ol style="list-style-type: none"> 1. Direct impact on the profitability of the project and duration of completion 2. Cashflow of the project depends upon the payment type chosen 3. Interim bill payment will get affected by the type of payment mechanisms chosen 4. Choosing the proper cost control technique in the pre-rendering stage will help the organization to increase profit and productivity 5. The outcome of the activities and the variances can be founded.
<p>Allowances for procurement, estimate, and Interim valuation -Access to information depends on the accurate determination of allowances</p>	<ol style="list-style-type: none"> 1. Cash flow of the client or contractor will get affected 2. The procurement, contingency allowances will allow for effective change orders for the unforeseen risk without causing the cost overrun 3. Insurance amount and risk allowances are impacted
<p>Preparation of human resource Forecasting</p>	<ol style="list-style-type: none"> 1. The hiring process and employing the skilled labor 2. The training and productivity will be get impacted
<p>Labor rates and productivity requirements</p>	<ol style="list-style-type: none"> 1. Overall cost of the project and profitability 2. The resource forecast plan depends on the productivity 3. Measure of the input and output is impacted
<p>Budget to build uses and outputs</p>	<ol style="list-style-type: none"> 1. The outcomes and goal setting 2. It may affect the cost benchmarking 3. The allowances and risk allowances
<p>Advice to the tender team for CAPEX procurement based on cost-benefit Analysis</p>	<ol style="list-style-type: none"> 1. Directly affects the profitability 2. Choosing the constructing technology and material 3. Quality of the product

Cost reporting	<ol style="list-style-type: none"> 1.The variation indication and process of variation order will be differing 2.The disputes and conflicts related to payment can be prevented by proper cost reporting 3.The forecast for the rest of the project and cost control process will be impacted
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4.1.2 Value Management

Table 2 Impacts study on the Value Management decision checkpoints

Commercial Decision points	Impacts
Deciding whether to choose an internal or external value engineering team	<ol style="list-style-type: none"> 1.Impact the cost and methodology 2.Choosing the material and the process because external value engineering team may bring a new perspective to the project rather than involving the design team member 3.Impacts the value management strategies
Choosing the method for value assessment	1.The value methodology and weighted analysis method of Conventional value engineering are limiting the design and construction source (Joel Ochieng Wao, 2018)
Framing the evaluation criteria	<ol style="list-style-type: none"> 1.Impact the ranking and the selection of material or process by the stakeholder 2.Creates limitation to add functionality
Taking the final decision	<ol style="list-style-type: none"> 1.Client satisfaction, quality, methodology, and cost of product or services is impacted 2.Improper value methodology may lead to cost addition
Deciding the Value Management strategies	1.Decision made in the value management has a significant effect on the entire value engineering process

4.1.3 Risk Management

Table 3 Impacts study on the Risk Management decision checkpoints

Commercial Decision points	Impacts
Risk & Contingency strategies, Risk Mitigation strategies	<ol style="list-style-type: none"> 1.Affects the quality of cost estimate 2.Impacts the probability of achieving the project objective 3.Improper strategies may cause the secondary risk 4.decision related to the level of analysis of risk drivers like conscious factor, subconscious factor, and affective factors and the way it is mitigated will impact the project cost
Opportunities identification	<ol style="list-style-type: none"> 1.Identify and handle the opportunities effectively 2.Increase the profitability of an organization 3.Proactive opportunity-seeking may also cause project creep or change fatigue
Financial & regulatory risk management	<ol style="list-style-type: none"> 1.Focusing on "risk management with ROI" directly impacts the profit by maximizing the profit and adding more value 2.Risk management maturity level increases the success of the project
Internal audit	<ol style="list-style-type: none"> 1.Affects the effectiveness of risk management 2.Decisions made elated to the risk management 3. "Impacts the risk controls and enterprise-level risk management process 4.pure compliance to a function that regularly reviews the risk profile for emerging risks and identifies trends as it keeps its finger on the pulse of business performance." (KMPG , 2018)

4.1.4 Contract Formulation

Table 4 Impacts study on the Contract Formulation decision checkpoints

Commercial Decision points	Impacts
Payment terms	<ol style="list-style-type: none"> 1.Impacts the cashflow and borrowing amount of the contractor or client 2. payment decision can prevent the payment follow up, any legal implication
verification of works and variation values	1.Claims and disputes related to the variation of scope or quantities can be reduced by choosing the proper change management process
record-keeping	1.the process and guidelines of record-keeping and documentation can help the dispute identification
The deciding procurement process, contract type, contract documents	<p>"1. The uncertainty of the scope of work needed</p> <p>2.The party assuming the risk of unexpected cost increases</p> <p>3.The importance of meeting the scheduled milestone dates</p> <p>4.The need for predictable project costs" (Libraries, 2018) . Based on the factor influencing the selection of procurement type, contract type, the commercial manager decision considering the factor directly impacts the project delivery</p>
Budgetary provision input	1.Impacts the quality of the forecast and the cashflow

4.1.5 Performance Management

Table 5 Impacts study on the Performance Management decision checkpoints

Commercial Decision points	Impacts
Financial Consolidation	<ol style="list-style-type: none"> 1.It helps to meet the compliance and global accounting regulatory requirement 2.The planning of consolidation rules set by the commercial manager with the accounting manager can impact the time saving 3.Data collection and the source can affect the final consolation process 4.The method of financial consolidation and the data collection can impact the time cycle
Robust reporting and analytics, including KPI's & Dashboards	<ol style="list-style-type: none"> 1.The outcomes of product or services 2.Quality, sustainably, productivity, information sharing can be enhanced
Decisions and inputs based on historical data	<ol style="list-style-type: none"> 1.The availability of the data and information available will impact the decision made by the commercial manager
Assessment of work done or delivered	<ol style="list-style-type: none"> 1.The performance evaluation system consists of a standard evaluation form, guidelines, and benchmark for assessing the performance of the individual, and assessing the work done can impact the quality, cost, and profitability of the project. Source: (FPM, 2016)
Profitability improvement and costing	<ol style="list-style-type: none"> 1.Direct impact on the profitability and the outcome of the project by the decision made to increase the profitability like the implementation of new investment, benchmarking the services, arriving at the total cost of product delivery, measurement of benefits, demonstration of value, identifying the opportunities for growth
Creating sustainable planning, budgeting, and forecasting models for performance improvement	<ol style="list-style-type: none"> 1.The efficiency of the financial planning depends on modern planning, budgeting, and forecasting techniques (KMPG, 2018) 2. Better data governance can increase the accuracy of the financial planning 3. The decision made by the commercial manager with the usage of technology in the planning, budgeting, and forecasting process can impact the tangible benefits

4.2 Evolution of decision-making process during the COVID-19 Pandemic

The decision-making process involves several decision points or gateways, through which the client assesses the development of objectives, value is being delivered, and the risk is acceptable. If the client holds power to make the design, the commercial manager shall present the information and suggestions to the client. The client will decide whether to proceed with the suggestion of the commercial manager.

"Traditional decision-making process involves

- I. Adoption of standard operating procedure.
- II. Incorporation and imbibing well-defined information channels in the organizational structure.
- III. Taking decisions by habit.
- IV. Deciding through intuition, creativity, and judgment.
- V. Training the selected executives in decision-making.
- VI. Adopting Rules of thumb method" (Preserve articles , 2018) .

The traditional decision-making result in high ambiguity and individual domination. After COVID-19, the digitalization of the workforce results in a shift towards data-driven decision-making in construction. Digital technologies enable greater collaboration among the workforce, control of value chain, and encourage innovations. Digitalizing the workforce will change the way of organization operation, design, planning, and client relationship. The use of the Internet of Things (IoT) in the construction site and the resource will increase data availability. The data related to productivity, safety, the operation can increase the site management and helps the higher management to decide to analyze the data.

The data can be feed into the BIM, where the behavior of the object of the building can be understood from a broader perspective. Virtual simulation using the digital twin adds dimensions like cost, time, sustainability, facility management in the early stage of the project rather than during the construction stage. These virtual objects can help the client make decisions like material selection, performing factors of the structure.

The comprehensive data from the construction can be stored and shared with the construction partner using the data centers. In India, the data center and its infrastructure are gaining much importance, and it will play a significant role in integrating the fragmented Indian construction industry.

McKinney & the company have modified the way of deciding the COVID-19 Pandemic. The McKinsey &Company report summary is speeding up the decision-making process by data-driven decision-making, greater collaboration using the digital tools, less hierarchical organizational structure, empower team, Hybrid working, realigning the roles and responsibility of higher-level managers and leaders to promote more modernized ideas.

Conclusion And Recommendation

5.1 Recommendation

5.1.1. Decision Support System

A decision support system is a computerized tool that helps increase the effectiveness of the decision-making process for semi-structural tasks. The tools and technology are used to support the decision-

making rather than replacing the management judgment. The decision-making process promotes objectivity and neglects subjectivity, and increases the decision-making speed. (Hastak, 2018)

The decision-making model for increasing the profitability in the construction project is

1. Choosing the profit-maximizing objectives
2. Impacts of the decisions on the entire project and to consider all the possible situations
3. Filtering the selection criteria, which is quantifiable for the decision points
4. Establishing the probability of achieving the events in the decision criteria
5. Practicing the possible result for the decision alternatives and simulating the action combination, if any new event occurs
6. Final decision is made – maxim rule can be used.

The decision support is shortlisted from the literature review for the five rules and responsibilities of the commercial manager. The shortlisted decision system will enable the data-driven decision-making process to increase the project's profitability and success rate.

Table 6 Comparison of Decision-making tools used in the literature review

Roles & Responsibilities	MCDA	AHP Fizzy	Bayesian	Machine Language	Mixed Methods
Cost Management & Performance Management	2	1	0	3	1
Value Engineering	1	3	0	1	1
Contracts Forumulation	1		0	2	
Risk Management	2		1	1	

5.1.2. Cost Information

The cost information considered while making the decision is very crucial. Only the relevant cost related to the decision-making should be considered because not all the costs will form the basis. During the prerendering stage, there will be much ambiguity in the cost information, so as the design development occurs, the accuracy of cost information increases. The cost information will be relevant only when developed at the right time for the commercial maker to make an accurate and satisfactory decision. The

different costs like an additional cost, differential cost, avoidable cost should be identified before taking the decision. "The distinguish of costs like reversible or irreversible, The controlled cost and the administrated one, Determined costs and discretionary costs, visible costs and hidden costs, n internal and external cost. From this brief overview upon costs results that authority of the decision-maker is limited to all internal costs, manageable ones. It will be obvious on costs, reversible and determined. On the other hand, the decision-maker influences only very little on administration costs and outsourcing" (Lepădatu, 2017)

The source of cost information may be derived from the database of similar projects, competitive rates, arrived from the economic and technical reports, or cost calculated from the same operating budgets. The digitalization of the workforce will enable an ample amount of data for the projects, and only the relevant cost should be considered. The cost behavior and relevance should be considered to choose the correct source for cost information.

5.1.3. User interference

The user interference should be designed before the central pretending process to be started. The creator of the user interference should clearly understand the user characteristics and the requirement and provide various design options to the users to provide effective usage and control of the functions in the system. (scholarworker , 2016) The user interference consists of model management and data management system to be connected for the smooth working of the decision support system. "The guidelines for designing the user interface include Strive for consistency, provide shortcuts for frequent users, provide informative feedback, design dialogs to create a closure, provide simple error recovery, permit easy reversal of actions, support internal locus of control, reduce information load proposed by Ben Schneiderman. He also listed uniformity of commands and interface, adaptability, execution time, versatility, quality of help provided, learning time for the DSS, ease of recall, fatigue as the factors that affect the success of user interfaces ." (scholarworker , 2016)

The user interference may be enabled to access the data from the web browser, dashboard, simulation software, and accessing the other customized gateway to software or structured programs customized gateway. The main functions include preparing the data query from the ample data available and help the commercial manager to select the best alternative after the analyses. The number of queries raised and successful completion of the raised queries using the data, model management, and user interfaces defines the effectiveness of the decision proposed by the DSS.

The benefits of the well-designed user interfaces include processing speed, increased productivity, reduction of errors, and human judgemental decision making, increasing the accuracy of the decision made by the DSS.

5.1.4. Knowledge Building

For the repetitive decision made in the project, the information and documents needed for the decision-makers shall be easily identified by the knowledge management process. The knowledge related to the project and the external environment is stored in a structured way, organized, and managed through the software to retrieve the required information quickly. Knowledge management forms the database for the decision support system and knowledge base management for future projects.

The data mining and the big data can be integrated with the DSS for data classification, clustering, and analysis purpose. The synergy between the decision support system and KM is discussed and elaborated in the Group System Support. "The GSS supports the group function like model management, data mining, idea evaluation, communication facilities, and dashboards. The research will establish a link between integrating knowledge management, strategic management, and the DSS to enable the business to gain a competitive advantage to achieve the business objectives.

5.2 Conclusion

The roles and responsibilities of the commercial manager differ across the type of organization. The questionnaire survey and literature review are done to identify the primary role and responsibility of the commercial manager. Cost management, performance management, value management, risk management, and contract formulation are the primary roles and responsibilities in the pre tendering stage. The interview has been conducted to identify the decision checkpoints in the prioritized roles and responsibilities of CM. The summary of the decision checkpoints [5.2 Objective 2] and their impacts on the project cost and the profitability are elaborated.

The decision-making process has evolved into data-driven, promotes greater collaboration, and involves more stakeholders by digitalizing the workforce. The decision support system should support the decisions made by the commercial manager to enable an increase in profitability. It helps make efficient and take faster decisions by making available relevant cost information and prediction at the right time to the commercial manager. The significant outcome of the research paper is the study of the impact of the decision made by the CM and the decision support system with synergies between the four attributes like decision model, knowledge management, cost management, and user interference to increase the profitability and to establish the group system support which consists of data mining, model management to analyze the big data available from the construction site.

Declarations

Competing interests: The authors declare no competing interests.

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Figures

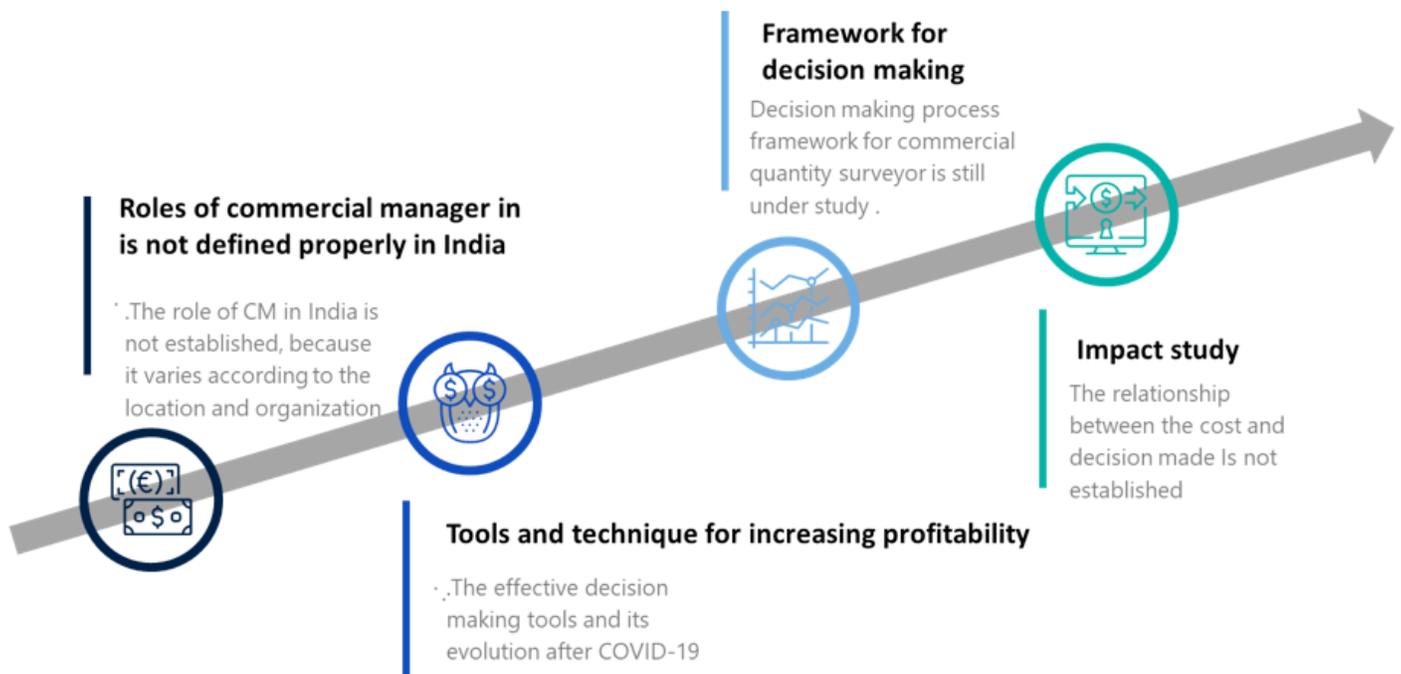


Figure 1

Research Gap Identified

LIMATATIONS CORRESPONDING TO THE RESEARCH

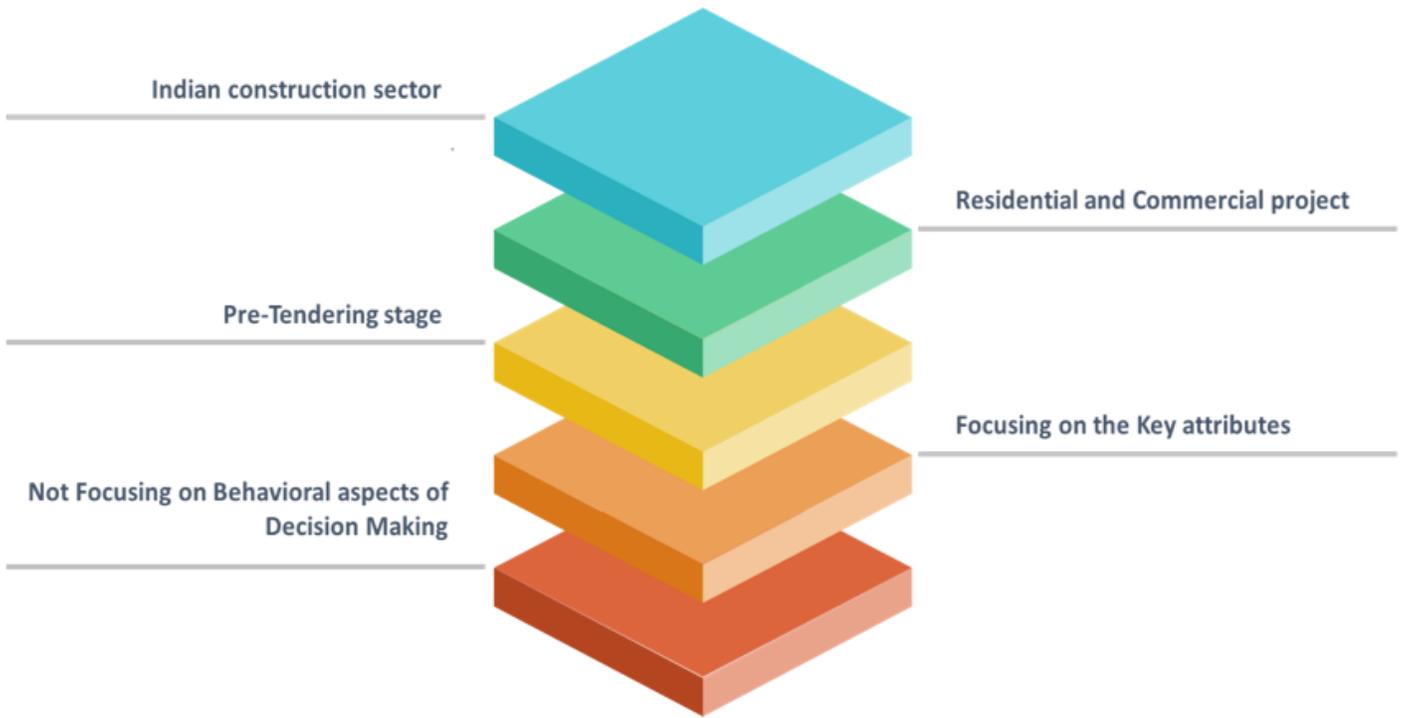


Figure 2

Limitations corresponding to research

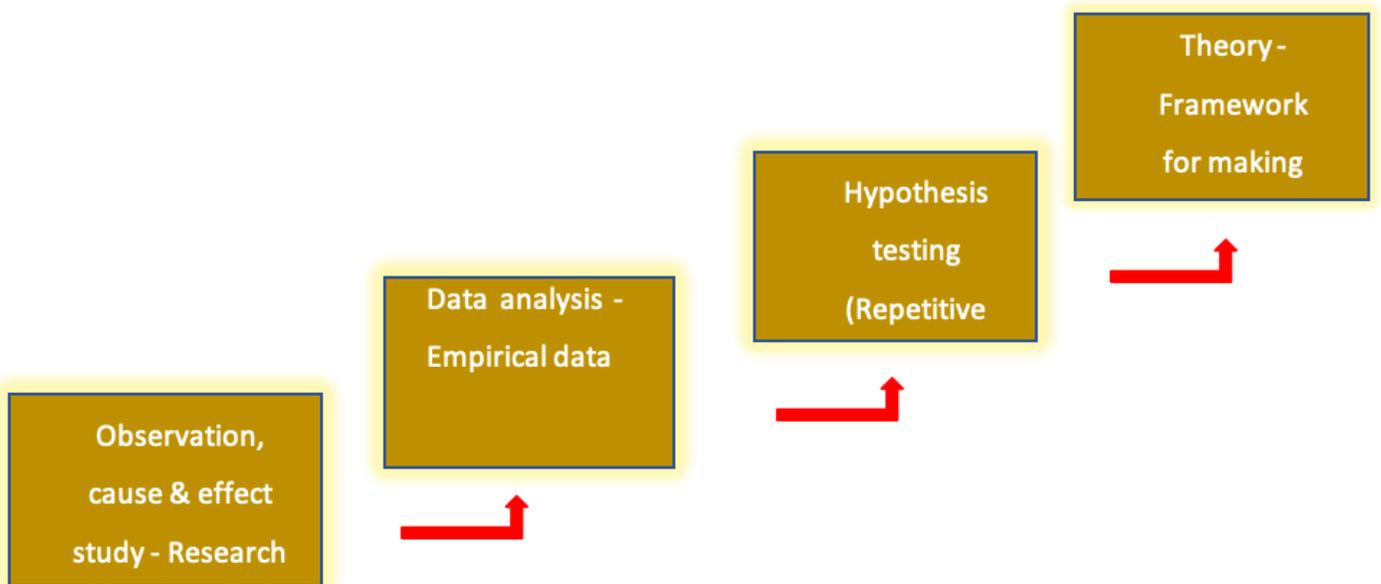


Figure 3

Bottom-up research methodology approach



Figure 4

Flowchart for Methodology



Rethink ways of working

1. Speed up and delegate decision making
2. Step up execution excellence
3. Cultivate extraordinary partnerships



Reimagine structure

4. Flatten the structure
5. Unleash nimble, empowered teams
6. Make hybrid work, work



Reshape talent

7. Field tomorrow's leaders today
8. Learn how to learn
9. Rethink the role of CEOs and leaders

McKinsey
& Company

Figure 5

Evolution of decision-making process after COVID-19 Outbreak

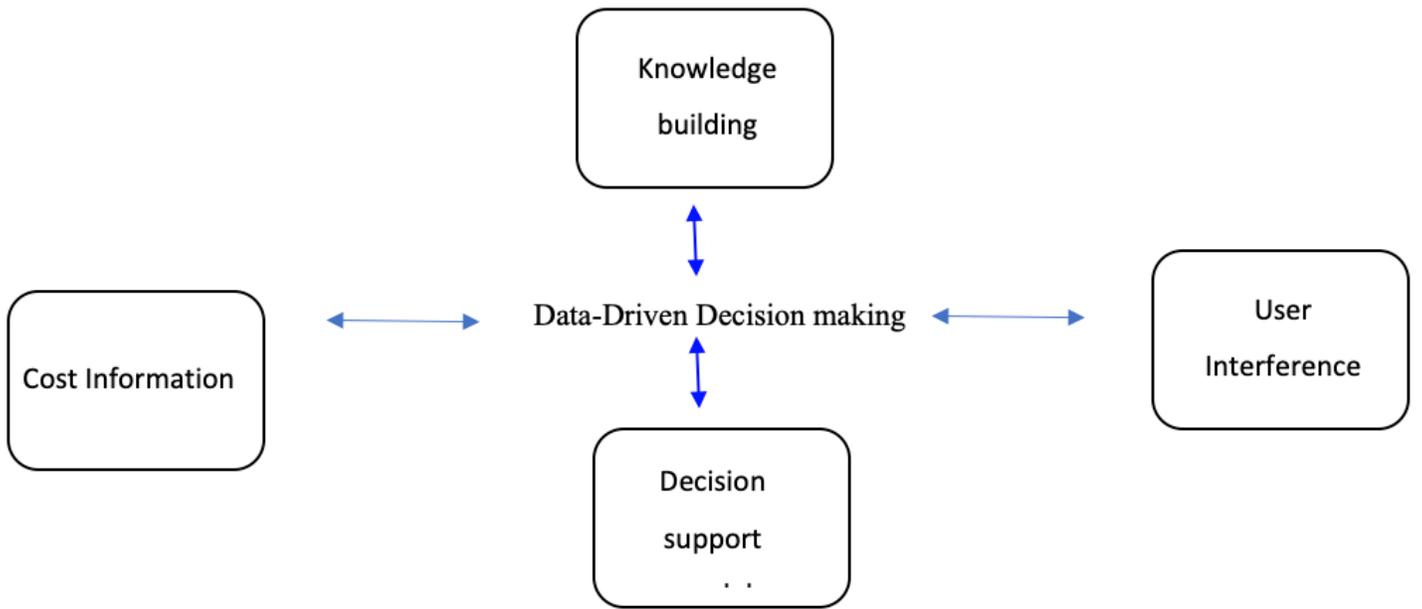


Figure 6

Effective decision-making attributes