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Study Of Value Identification Process In Projects Of Construction Equipment Manufacturing Industry

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ABSTRACT

Manufacturing of construction equipment is crucial to the expansion of physical infrastructure across the world. to maintain growth, profitability, and customer happiness in this fiercely competitive and continually expanding industry, it is crucial to discover and maximize value in initiatives. this summary summarizes the most important factors and methods for determining the project's worth while constructing construction equipment. manufacturers, suppliers, consumers, and regulatory authorities are just few of the many parties involved in the construction equipment manufacturing industry's value identification process. an in-depth examination of market dynamics and consumer preferences comes first. aligning project goals with market demand requires an understanding of client preferences, evolving technology, and regulatory restrictions.

KEYWORDS: Value, Management, Construction, Equipment, Projects

1. Introduction

1.1 Value Management in Construction equipment manufacturing industry

Value Management (VM) is an interdisciplinary strategy with the goal of optimising the value an organisation generates via its processes, initiatives, products, and services. VM is based on the tenets of efficiency and continuous improvement, and it aims to boost efficiency, customer satisfaction, and stakeholder involvement while reducing costs and risks. The idea of value is central to VM. However, in this case, value is not limited to monetary rewards alone. Included in this category are the positive effects on the company's consumers, workers, shareholders, suppliers, and communities. Accordingly, Value Management stresses the need of aligning strategies, actions, and resources to strike a balance between competing stakeholder interests and the organization's ultimate goals.[3]

1.1.1 The first step in value management is to define and recognise value from different stakeholder viewpoints. Recognising the value of a company's contributions to society and shareholders requires an appreciation of what it is that consumers really want. Organisations may learn what is valuable in a certain setting by working together to define that value.

1.1.2 Value Analysis and Optimization:VM is the process of examining a process, project, product, or service for ways in which value may be enhanced after value has been identified. Value Stream Mapping, cost-benefit analysis, and performance monitoring are typical tools used in this sort of investigation. The objective is to improve operations so that more is accomplished with less effort.[4]

1.1.3 The importance of including stakeholders in the value creation process is emphasised heavily by VM. With this method, everyone's voice can be heard and their ideas may be included into the final product. Stakeholders that are actively involved are more likely to provide feedback, resources, and dedication to efforts that provide value.

1.1.4 Performance Metrics:Due to its multidimensional character, measuring value may be difficult. Value management (VM) is based on key performance indicators (KPIs) that account for both monetary and intangible worth. Organisations may use these metrics to monitor development, gather data for deliberation and decision-making, and report on value-added accomplishments to stakeholders.

1.1.5 **Innovation and Creativity:**Innovation and creative problem solving are fostered by the Value Management philosophy. Organisations may find new methods to create value if they take a creative approach to solving challenges and satisfying stakeholder requirements. The key to success in today's ever-changing corporate climate is fostering an environment conducive to creative problem solving and risk taking.[5]

1.2 Importance of Value Identification in construction equipment industry

1.2.1 With proper Value Management (VM), building projects may succeed by maximising the return on investment for all parties involved. Several significant advantages of VM contribute to the efficiency, effectiveness, and overall success of a building project, which involves complicated procedures, huge investments, and a wide range of stakeholders:

1.2.2 Decisions made with VM's help are made to save money without sacrificing quality. VM finds ways to save money, avoid delays, and make better use of resources by analysing both the components and alternatives of a project. This results in more efficient use of funds and greater financial stability all through the project's lifespan.

1.2.3 There are many people that can have an impact on a construction project, and they all have different needs and requirements. When stakeholders work together, their demands are better recognised and can be satisfied. This harmony lessens friction, improves lines of communication, and encourages teamwork, all of which are necessary for a successful project.[6]

1.2.4 Value Management is a technique that encourages careful forethought and early evaluation of project goals. Scope, requirements, and objectives are all part of this process, since they provide context for assessing the project's strengths and weaknesses. Project success is built on a solid foundation, and VM can help with that.

1.2.5 When used in building projects, VM promotes originality and creativity. VM teams are able to suggest innovative solutions by analysing the pros and cons of alternative design and construction approaches, technologies, and materials with the goal of improving both performance and value delivery. Improvements in project results may result from the use of such novel approaches.

1.2.6 Risk analysis and prevention methods are a part of Value Management. Project teams may better prepare for and respond to surprises by anticipating possible risks early on in the process. This preventative method lessens the likelihood of interruptions and boosts the durability of the project.

1.2.7 Organisational success, efficiency, and happiness among stakeholders may all be enhanced via the application of Value Management (VM). There will be improvements in decision-making, resource utilisation, and value delivery across the board as a result. The following are some of the most important gains from adopting Value Management:

Cost Savings: VM analyses processes, operations, and resources to find ways to save costs and remove waste. Organisations may save a tonne of money across the board on projects and operations if they learn to maximise cost-efficiency without sacrificing quality.

Enhanced Stakeholder Satisfaction: Stakeholders' wants and requirements are prioritised in VM. By including them in the value evaluation, you can make sure their input is taken into account and arrive at results that meet

their needs. The happiness of stakeholders and the quality of relationships both benefit from this.[8]

Informed Decision-Making: In order to make educated judgements, VM offers a methodical framework for doing so. Potential value contributions help businesses choose the best methods, designs, or techniques for their initiatives, which in turn improves results.[9]

Efficient Resource Allocation: By concentrating on the areas that bring the most value, businesses may better manage their resources through the use of virtualization technology. By doing so, we can avoid squandering assets and instead put our money towards the projects that will have the biggest influence on moving our company forward.

Innovation and Creativity: By comparing and contrasting various strategies, VM promotes original thought. Companies may stay ahead of the competition and on the cutting edge of innovation by encouraging a culture of creativity among its employees.

1.4 Techniques of material management

Project delays were analyzed using a S curve to see how far off schedule they really were. The first order of business is to do tracking and identify the problem. Aditya A. Pandey (2015) used MSP to analyze a S Curve. The material consumption in the plan and in the experiment were compared using a S curve analysis. As the cost of particular parameters rises with respect to time, the resulting S-shaped graph represents the project's trajectory as a deviation curve. The purpose of this study was to examine the variance between budgeted and actual material costs. The author draws the conclusion that varying requirements for various parts of a project might need more spending. After the project's delay, an EOQ study was conducted. Delays in previously planned projects. The increasing project costs were addressed by doing an EOQ study. In order to get the necessary supplies in a timely way, it is helpful to have an idea of the order amounts. Additionally, a frequency ranking may be calculated. Q, Quantity for Economic Ordering Cost of Ordering, or C0 Cu = Price of Item S = Total Intake Using the formula I = inventory carrying cost, we can get the financial order quantity and the overall cost of inventory. When compared to the cost without the EOQ analysis, the price achieved with it is cheaper. As a result, this analysis is suggested, and the price drops.[10]

1.1 With its methodical approach to achieving a sweet spot where project goals, prices, and quality all come together, Value Management (VM) has quickly become an indispensable tool in the construction equipment manufacturing industry. Due to the importance placed on accuracy, originality, and efficiency in Mechanical Engineering, the incorporation of Value Management concepts is crucial for the timely and effective completion of projects. This introductory talk explores what Value Management is and why it's important for Mechanical Engineers to understand it when it comes to projects. Because of their complexity and resource requirements, construction equipment manufacturing projects now necessitate a more integrated strategy that balances the needs of all parties involved. Value Management, also known as Value Engineering, is a method for improving the effectiveness, efficiency, and value of a project. It is sometimes misunderstood as only a means of decreasing costs. Based on the premise of function-based analysis, VM seeks to optimize the fundamental goals served by a project by identifying and enhancing its functional characteristics, all the while reducing its overall cost and overhead.

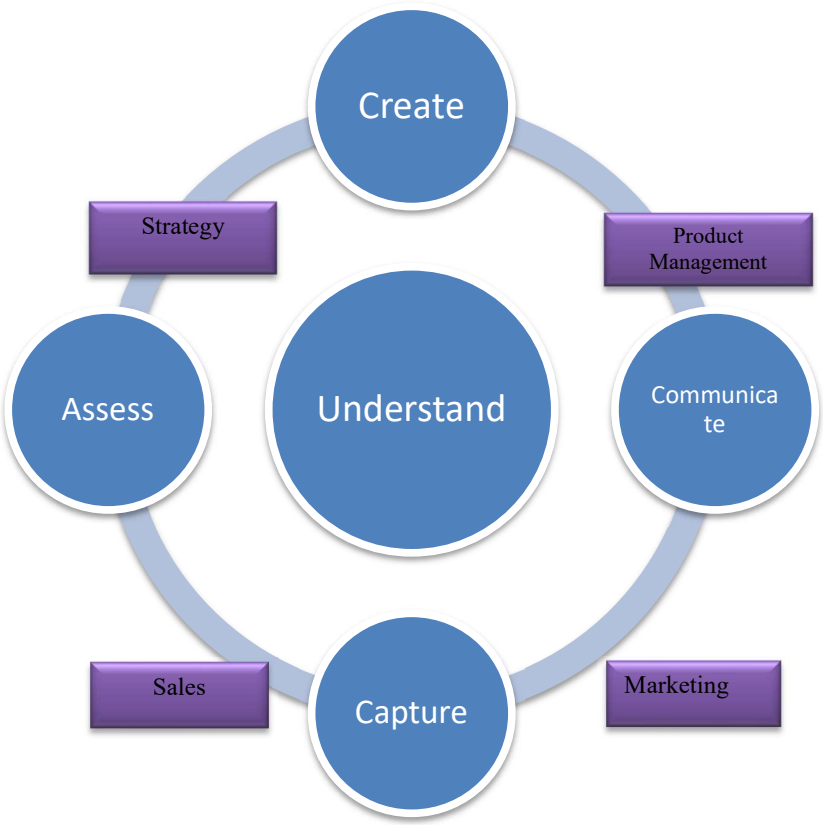
1.2 Construction equipment manufacturing industry projects rely heavily on the expertise of mechanical engineers, who focus on the creation and installation of mechanical systems and parts. A significant amount of most project budgets goes on these kinds of systems. Cost reduction, enhanced performance, and new ideas are just some of the many positive outcomes that may result from applying Value Management principles to Mechanical Engineering. It is important to remember that Value Management is a methodical process that entails many steps. The first step is to form a team made up of people with varying viewpoints on the project, such as designers, engineers, contractors, and clients.

1.3 The team then does an in-depth examination of the project, taking a close look at how the various parts, systems, and materials contribute to the whole. By breaking down the project into its component parts, the team can more accurately assess the importance, effectiveness, and room for improvement of each component. Insights gained during this phase of analysis frequently lead to the development of novel approaches, opening up the possibility of investigating less expensive options without sacrificing quality or usefulness. Once opportunities for enhancement have been discovered, the team assesses them using a set of criteria that may include technical feasibility, economic implications, risk assessment, and environmental effect. Through this methodical analysis, participants in the project may make choices

that further its broad aims.

The participants in a project are able to communicate and work together more efficiently because to Value Management. Through workshops and brainstorming sessions, teams from different departments may exchange ideas, test assumptions, and come up with solutions to maximise value. By encouraging team members to contribute their unique perspectives and ideas, this participative method creates an atmosphere where everyone feels invested in the success of the project.

1.1 Definition and concept of Value Management



3. Methodology

3.1 Research Design

Defend the research methodology you used and how it served your stated aims. A mixed-methods strategy might be used for value management, which incorporates both qualitative and quantitative elements. By using this route, we can learn everything we need to know about how value management works in mechanical engineering building projects.

3.2 Data Collection

This study combines a survey and questionnaire with written materials from the past and research papers pertaining to data collection. 15 businesses in total—5 small, 5 medium, and 5 large—were chosen at random for this study. The information gathered from the questionnaire survey and associated information was appropriately and methodically examined. According to the data collected, it was found that there are some defects in the materials management system of the three dimensional construction companies, which are affected by the management system. Gathering historical and contextual data on the use of value management in mechanical engineering projects requires a review of project reports, documentation, and related literature.

3.3 Ethical Considerations

Deal with the moral implications of your research by following institutional and/or national norms and gaining participant agreement, among other ethical considerations.

4.1 Application in Mechanical Engineering

Mechanical engineering projects may be optimized with the help of value management concepts by ensuring that performance criteria are met while costs and risks are reduced. Various essential ideas and their practical ramifications help clarify the implementation of value management in mechanical engineering. See Table 1 for a comprehensive summary of how value management is used in actual mechanical engineering projects.

Table 4.1: Application of Value Management Principles in Mechanical Engineering Projects

Value Management Principle	Application in Mechanical Engineering Projects
Functional Analysis	Decompose mechanical systems into their constituent functions. This aids in understanding the core functionalities and exploring alternative designs and technologies that can achieve these functions more efficiently.
Value Engineering	Identify opportunities to enhance mechanical components' value by optimizing their performance, functionality, and quality while simultaneously minimizing costs through design improvements and material selection.
Life-Cycle Cost Analysis	Evaluate the entire life-cycle cost of mechanical systems, including installation, maintenance, operation, and potential replacements. This enables informed decisions to achieve long-term cost-effectiveness.
Risk Assessment	Assess potential risks associated with mechanical components or systems. By identifying and mitigating risks, projects can avoid costly failures, delays, and safety hazards during operation.
Innovation	Integrate innovative technologies, materials, and manufacturing processes to enhance mechanical system efficiency, durability, and performance, often leading to competitive advantages in the market.
Sustainability	Incorporate sustainable design practices into mechanical engineering projects to minimize environmental impact, reduce resource consumption, and promote long-term ecological balance.

Value management in mechanical engineering projects relies on these guiding concepts. They help engineers, project managers, and stakeholders strike a good balance between performance, cost, risk, and sustainability while making important decisions.

5. Concept and Study

5.1 Value Identification

- In order to spot possibilities for value creation and foresee their consequences. In the industrial sector, value identification is a continual process that necessitates actions for constant development. Some examples of such methods include those designed to reduce waste, faults, and variability in production. In order to maximize value creation, manufacturers should strive for continual improvement in all areas, including process optimization, cost reduction, product quality enhancement, and customer happiness. The industrial sector relies heavily on value identification, making it crucial to embrace new technology and encourage a culture of innovation.
- Manufacturers who keep abreast of emerging technologies can better seize chances for automation, increased productivity, and product differentiation. The manufacturing firm's ability to compete in the market may be improved by allocating resources to R&D in order to discover new value-added features, methods, or materials. Value identification, also known as value sense making or value definition, is a crucial first step in the value creation process in an organization's structure. In the early phases of a project is when the value exchanges may occur, but the important repercussions and implications may not be realized until the later stages of the project if the value is not discovered and recorded.

5.1.1 Interactions for Value Identification

- Collaborative learning involves external and internal stakeholders, such as suppliers and end-users, as part of an absorptive learning process.
- When a client organization is unsure of an existing service system, including its procedures and service capability, a co-revealing interaction is employed.

- Strategic expectations and requirements should be harmonized. Client organizations engaged in such dialogue with suppliers in order to learn more about the market for a given product or service, or to ensure that their strategic requirements and goals were being met.
- Collaboration in product and service design. After senior stakeholders have agreed on the strategic value propositions, the project teams may begin designing and configuring the value propositions.
- When people talk about "co-developing a service with agility," they're referring to working together to quickly and effectively bring a service from concept to completion, encompassing all of its tangible and intangible components.

5.2 Value Sense making

- Stakeholders, who are typically members of interdisciplinary project teams, participate formally or informally in the Value Sense making process by exchanging information and brainstorming ways to apply lessons learned from previous projects to the current one. Values analysis is the method through which stakeholders in a system or project attempt to identify and make sense of the competing values that exist within it. It entails learning what various groups deem important and catering to their wants, requirements, and preferences. In order to make sense of a situation, it is necessary to talk to and listen to the people involved to get to the bottom of what they really want. The Project Manager is responsible for facilitating this dialogue. Value negotiation is an essential part of every project or program's execution, and it falls within the purview of the project manager. The discussions may take place before or throughout the course of the projects, and their outcomes are summarized into agreed-upon commonalities. Relevant stakeholders may be narrowed down to a smaller subset if they have a shared interest in the topic at hand. The talks range from ethical, ecological, and strategic principles to practical solutions for products and services, as noted by Hooge and Hatchuel.
- The external stakeholders might be included if necessary. The areas of focus that need further investigation in order to build a solid proposal are thus defined. This contributes to the enabling strategic road plan by highlighting opportunities for collaboration on novel value generation activities.

5.2.1 Co-Learning

The term "co-learning" was coined to describe the process through which many participants in the construction equipment industry—including manufacturers, suppliers, contractors, and technology providers—work together to learn from one another and develop new ideas. In this setting, the benefits of co-learning may be substantial, resulting to enhanced productivity, safety, sustainability, and overall performance.

Co-learning facilitates the sharing of latest innovations and best practices in technology among business professionals. New technologies, such as autonomous equipment, Building Information Modeling (BIM), and Internet of Things-based monitoring systems, may be adopted more rapidly via coordinated efforts.

By exchanging information about equipment upkeep, operation, and use, co-learning improves resource efficiency. As a result, there is less need for repairs, more efficient use of machinery, and lower overall expenditures.

Safety Improvement: Safety procedures and standards may be more widely disseminated within an industry when people work together to learn. By discussing what was learnt from unfortunate events, safety measures may be improved and hazards mitigated.

Sustainability and Environmental Practices: Environmental effects may be lessened and energy efficiency in construction equipment can be increased by the sharing of sustainable and eco-friendly building techniques that can be learned through co-learning

Enhanced Market Competitiveness: By pooling their knowledge about the market, the tastes of their customers, and the emergence of new prospects, businesses that engage in collaborative learning have a leg up on the competition.

Talent Development and Skill Enhancement: Especially for the younger workforce, co-learning offers a platform for skill development and information transfer, which aids in closing the skills gap and boosting total industry competence.

5.3 Co-Revealing

The term "co-revealing" was coined to describe the process through which many participants in the construction equipment industry—including producers, buyers, sellers, and others—work together to generate novel solutions,

products, and services that benefit all parties involved. Some of the most important benefits of Co-revealing in the construction equipment business are outlined below, along with references to back up these claims:

Customer-Centric Solutions: To better meet market requests, equipment makers may tailor their offerings and make their products more user-friendly using the data gleaned by co-revealing. Construction equipment may benefit from increased innovation and market distinctiveness if it is designed through collaborative co-disclosure to generate new ideas, features, and functions.

Reduced Time-to-Market: Co-revealing expedites prototyping, testing, and commercialization by incorporating important stakeholders from the outset of the product development process.

Enhanced Quality and Reliability: The co-revealing method provides a thorough evaluation of equipment design and functioning, leading to better quality and more dependable goods by including a wide range of stakeholders.

Risk Mitigation: Early fault detection by co-revealing may save money by avoiding expensive adjustments or recalls after a product's release due to design or operational problems.

Sustainable Practices: Aligning with rising market trends towards eco-conscious solutions, collaborative Co-revealing may aid in the creation of environmentally friendly and sustainable equipment designs.

Stakeholder Engagement and Relationships: Co-disclosure helps businesses connect with one another, which increases trust and encourages long-term collaborations that benefit both parties.

While the notion of co-revealing has been researched extensively in other businesses, including those that produce construction equipment, the construction equipment sector has not. However, the general literature suggests that the ideas of Co-revealing may be modified to this situation.

5.4 Co-Aligning

During the construction equipment production process, co-aligning refers to the process of making sure all the different parts and pieces are properly aligned so that the final product is of the highest quality possible. Co-aligning entails putting parts in the right places and making the right adjustments so they operate together smoothly, which boosts output, quality, and profitability.

Assembling machinery with proper alignment increases operating efficiency and overall performance in the construction industry. Aligned parts wear out less quickly, therefore properly aligned machinery lasts longer and functions more dependably.

Rework, scrap, and faults in the final product are all kept to a minimum with the help of co-aligning. This results in savings since less changes, repairs, and reassembly are required.

In the manufacturing industry, alignment is an essential part of ensuring consistent quality. Consistent product quality is essential for fulfilling industry standards and consumer expectations, and well-aligned components assist preserve this consistency and decrease variances between individual units.

Aligned construction machinery is less likely to malfunction or cause injury to workers. As a result, the equipment will be more reliable and safer incidents will be avoided.

Consistently producing well-aligned and durable construction equipment helps manufacturers earn a reputation for quality. More satisfied customers are more likely to buy from you again and spread the word about your excellent service.

Co-aligning methods have the potential to speed up production, decrease assembly time, and boost efficiency. This might increase production and speed up the time it takes to introduce new machines to the market..

Investing in precise equipment and training to guarantee perfect alignment is necessary, but the savings on warranty claims, after-sales service, and component replacements may add up to a significant sum over time.

5.5 Value Definition

The purpose of establishing key performance indicators (KPIs) is to monitor progress toward project goals and ensure that those goals are being met.

5.5.1 Co-Designing

The term "co-designing" is used to describe the process of involving numerous parties in the construction sector to identify, define, and rank the factors that add value to a project. Value, it is said, is multidimensional and must be evaluated from many angles, such as monetary, ecological, social, and practical ones.

To further ease co-designing in value discovery, the construction sector often employs the Value Management technique as defined by Kelly (2013). In order to make choices that maximize the project's value, this approach prioritizes learning about the many stakeholders and what they care about. Implementations of co-designing in

value identification, such as the Crossrail project in the UK, have shown how including the opinions of different stakeholders, such as local residents, engineers, and policymakers, improved project results. Together, these citations show how co-designing in value identification may improve communication, creativity, and sound judgment in the construction sector, leading to projects that benefit everyone involved.

5.5.2 Co-Developing

"Co-developing" is a term often used in the construction industry to describe the process of bringing together many parties to define and create value for a project. This method acknowledges that value is relative and might change depending on who is asked.

Shen et al. (2011) is a significant source because it emphasizes the need of integrating all project partners in value identification, not only designers, contractors, customers, and end-users. This co-developing strategy improves project performance by allowing all parties to jointly define value drivers and align project objectives.

In addition, Abduh et al.'s (2020) research highlights the significance of BIM's capacity for value co-development. Better value is identified and delivered thanks to increased stakeholder engagement made possible by BIM's unified visualization, analysis, and optimization of building projects.

The Lean Construction methodology, as explained by Ballard and Howell (2003), likewise encourages co-developing value by minimizing non-value-added operations and increasing those that create value. This method promotes teamwork among project members to simplify procedures and increase the project's value.

Co-developing in value identification led to effective project results in real-world case studies like the Vancouver Convention Centre Expansion Project by incorporating different stakeholders and taking their opinion into account all through the project lifecycle.

Collectively, these citations show that co-developing in value identification within the construction sector promotes cooperation, creativity, and improved project results, leading to projects that better match with the demands of stakeholders and create more value.

Research Methodology :

The primary foundation of research methodology is a quantitative model of survey and analysis. In order to determine the value process requirements and how they interface with the project manager, this study examines the body of literature already written about project and value management as it relates to the manufacturing business. The results are then translated into a structured questionnaire. After that, the questionnaire is distributed to a targeted set of project industry participants in order to gather quantitative and qualitative input for the purpose of analyzing two factors. –

(1) Do the stakeholders accept the literature's theoretical recommendations regarding the function of the project manager?

(2) Are these recommendations implemented in the field of project management today? In keeping with the aforementioned literature analysis, we discussed the following questions with stakeholders from a sample of the project-based manufacturing sector, concentrating on the construction equipment sector.

2. Literature review

SN	Author Name	Year	Conclusion	Research Gap
1	Liu, G., & Jiang, H.	2020	Understanding the wants and preferences of stakeholders requires extensive study into value identification. Organizations may better align their plans with societal and economic goals if they take into account the values of various stakeholders, including as consumers, workers, and communities, as discussed in the literature on shared value. To improve competitiveness and social impact, this study lays the groundwork for developing goods, services, and activities that resonate with stakeholders.	The paper explores performance monitoring of project earned value while considering scope and quality. Findings suggest that integrating scope and quality considerations into earned value analysis enhances project performance monitoring, enabling better decision-making for project managers.
2	Araszkiewicz, K., & Bochenek, M.	2019	Innovation and long-term growth rely heavily on value identification studies. Companies and organizations that put value discovery at the forefront are more likely to develop cutting-edge offerings that meet the ever-evolving demands of their customers. In the field of sustainability, it is important to stress that learning about people's priorities may help produce green answers to major global problems.	The paper presents a case study on the use of the Earned Value Method (EVM) for controlling construction projects. The findings indicate that EVM allows for effective project monitoring, cost control, and early detection of deviations from the planned schedule and budget, ultimately leading to improved project management outcomes.
3	Narayana, D. G.	2019	Research into identifying value is crucial for improving consumer involvement and loyalty. Researchers have shown that companies may create deeper ties with their consumers by catering to their values and providing them with products and services that reflect those beliefs. Customer loyalty, repeat purchases, and favorable word of mouth are all boosted as a result of these interactions.	The paper discusses the cost analysis of construction building using the Earned Value Method (EVM) with MS Project software. Findings highlight the effectiveness of EVM in accurately tracking project costs, identifying cost variations, and aiding in timely decision-making to ensure project success within budget constraints.
4	Attarzadeh, I., & Hock, O. S.	2018	Research on value identification also plays a significant function in risk reduction and reputation management. Businesses with a keen	The paper proposes a new forecasting model to enhance the accuracy of the Earned Value Index for project time and cost

			awareness of their stakeholders' priorities might head off any possible tensions or poor public views. A company's reputation may be strengthened and reputational risks reduced by taking the time to learn about and manage how its values compare to those of its stakeholders.	estimation. Findings suggest that the proposed model improves the predictive capabilities of the Earned Value Index, leading to more precise estimations of project time and cost, thereby aiding in better project management decisions.
5	Tereso, A., Ribeiro, P.,& Cardoso, M	2017	The importance of value identification studies in public policy and social impact is comparable to its significance in the commercial sector. In order to create effective policies or programs, researchers like stress the need of learning about the public's goals and values. Researchers who focus on identifying values can help politicians design programs and policies that better reflect the needs and priorities of the people they serve.	The paper proposes an automated framework for integrating Earned Value Management (EVM) and risk management. Findings suggest that this integration enhances project monitoring and decision-making by providing a comprehensive view of project performance and associated risks, leading to improved project outcomes and mitigation strategies.
6	Kelly, J.	2013	Understanding the needs and wants of one's target market is essential for any firm, making value identification research in marketing an important field of study. In this article, we examine the literature to learn how value identification studies have influenced modern marketing practices and how businesses can focus on their clients. It demonstrates the connection between understanding what customers value and providing something to them in order to boost loyalty and profitability	The paper offers a critical review of value management practices in construction. Findings suggest a need for reevaluation and refinement of current value management practices to better align with evolving project needs and industry standards, ultimately leading to improved project outcomes and value delivery.
7	Leung, M. Y.,	2011	Value identification research is crucial to the healthcare industry's goal of bettering patient outcomes and healthcare delivery. This article explores the significance of value identification in healthcare, focusing on its effect on patient happiness, efficiency, and quality of service. Methods and strategies for determining patients' priorities are discussed, as well as the impact that doing so may have on healthcare	The paper discusses the application of value management in the Vancouver Convention Centre Expansion Project. Findings highlight the successful implementation of value management techniques, which led to improved project efficiency, cost savings, and stakeholder satisfaction, demonstrating the effectiveness of value management in large-scale

			decision-making.	construction projects.
8	Abduh, A.,& Ogunlana, S. O.	2020	Research on value identification is becoming increasingly important in ecological situations as the pursuit of sustainability gains momentum across the world. In this analysis of the available literature, we investigate the function of value determination in inspiring eco-friendly actions and lasting lifestyle changes. It explains how pro-environmental activities and policies can be motivated by an appreciation of how people's values differ from those of the government.	The paper explores enhancing the value identification process in construction using Building Information Modeling (BIM). Findings suggest that integrating BIM into the value identification process improves collaboration, decision-making, and project outcomes by providing a comprehensive and visual representation of project data, ultimately leading to enhanced value delivery in construction projects.
9	Ballard, G., & Howell, G.	2003	Research on value identification is crucial in the classroom because it guides instructional strategies, curriculum creation, and student involvement. The importance of value identification in education is explored, with a focus on its function in improving teaching and learning and promoting equality in the classroom. It also describes how educators have used value identification to better meet the needs of their students.	The paper presents the concept of Lean Project Management. Findings suggest that applying lean principles to project management can significantly improve project efficiency, reduce waste, enhance collaboration, and ultimately lead to better project outcomes in terms of cost, time, and quality.
10	Smith, J. A.	2020	The success of a company and the well-being of its employees are contingent upon the organizational culture. This literature research examines the importance of value recognition within the framework of organizational culture. There is ongoing discussion over the potential benefits of aligning all individuals inside an organization with the company's fundamental values, which may include enhancing morale, productivity, and fostering a collaborative work environment. Furthermore, the study also explores the role of value identification in facilitating corporate decision-making processes and resolving disputes	The paper investigates strategies for enhancing project success in the construction equipment manufacturing industry, with a focus on value identification. Findings suggest that emphasizing value identification processes improves project outcomes by aligning project objectives with stakeholder needs, enhancing efficiency, and optimizing resource allocation.

Summary of Literature Review

SN	Outcome of literature review	Reference
1.	It is required that Active Participation of each INDIVIDUAL FUNCTIONAL MANAGER's is considered essential in the process of Value Creation.	**6**
2.	It is recommended that EMPATHIZING | MUTUALLY UNDERSTANDING views regarding technical, process, organisational improvements / innovations with internal and external stakeholders for discovering potential value in forthcoming projects. This happens during interaction in COMMON FORUM, specifically meant for Value Creation	**10,6**
3.	IDEATION (CONCEPTUALIZATION) OF POTENTIAL VALUE CREATION After interactions, team of Internal & External Stakeholders, in above interactions arrive to the broad consensus on the "CONCEPT "regarding creating value and set the context for next interactions.	**1,4**
4.	It is seen that VALUE CREATION Arrive at the firm proposal of value creation. † Structured discussions with External Stakeholders for transforming the Concept of Potential Value Creation to the Firm Techno-commercial proposal † Structured discussions with Internal Stakeholders for transforming the Concept of Potential Value Creation to 'Proposal for internal Technical and Procedural Developments' (Value Harvesting).	**7**
5.	It is important that VALUE CAPTURE Transform Proposal of Value Creation to Signed Techno-commercial Contract with Customer, External stakeholders with discussions and negotiations.	**5**
6.	VALUE HARVESTING Submit the detailed report on Value Creation & Value Capture to Management to retain the learning within organisation. † These improvements / changes regarding value creation can be incorporated in techniques of other projects / programmes &, processes, strategies of organisation.	**3,7**
7.	VALUE DELIVERY AS PER CONTRACT AMENDMENT Organisation undertakes execution of all contractual commitment as per contract amendment and monitor the delivery as per set terms of contract.	**4**

Format of Questionnaire

SN		Fully Agree	Partially Agree	Can't Say	Partially Disagree	Fully Disagree
1.	Active Participation of each INDIVIDUAL FUNCTIONAL MANAGER's is considered essential in the process of Value Creation.					
2.	EMPATHIZING | MUTUALLY UNDERSTANDING views regarding technical, process, organisational improvements / innovations with internal and external stakeholders for discovering potential value in forthcoming projects. This happens during interaction in COMMON FORUM, specifically meant for Value Creation					
3.	IDEATION (CONCEPTUALIZATION) OF POTENTIAL VALUE CREATION After interactions, team of Internal & External Stakeholders, in above interactions arrive to the broad consensus on the "CONCEPT "regarding creating value and set the context for next interactions.					
4.	VALUE CREATION Arrive at the firm proposal of value creation. † Structured discussions with External Stakeholders for transforming the Concept of Potential Value Creation to the Firm Techno-commercial proposal † Structured discussions with Internal Stakeholders for transforming the Concept of Potential Value Creation to 'Proposal for internal Technical and Procedural Developments' (Value Harvesting).					
5.	VALUE CAPTURE Transform Proposal of Value Creation to Signed Techno-commercial Contract with Customer, External stakeholders with discussions and negotiations.					
6.	VALUE HARVESTING Submit the					

	detailed report on Value Creation & Value Capture to Management to retain the learning within organisation. † These improvements / changes regarding value creation can be incorporated in techniques of other projects / programmes &, processes, strategies of organisation.					
7.	VALUE DELIVERY AS PER CONTRACT AMENDMENT Organisation undertakes execution of all contractual commitment as per contract amendment and monitor the delivery as per set terms of contract.					

Sample Size selection and Industry Survey

Sample Size: The Heavy Duty Automobiles, Ancillaries to these Industries, and Construction Equipment Manufacturing Industries in the vicinity of Pune are the industries we have selected to sample. The construction equipment industry and its related support sectors are the main focus of attention in order to calculate the sample size. Online resources were used to locate the businesses. Project managers, designers, production, and quality staff were given questionnaires to complete in order to have a thorough grasp of the process needs.

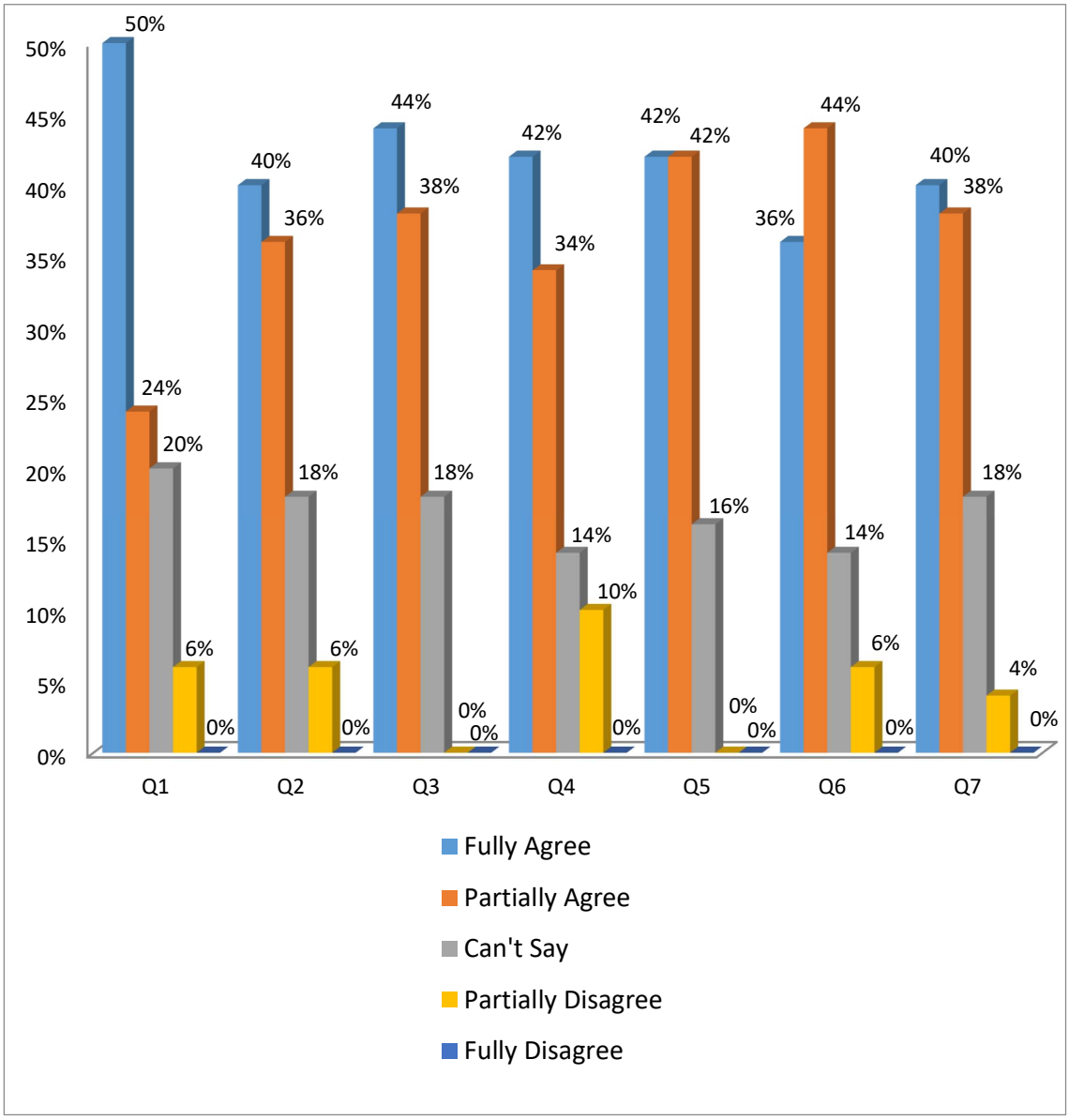
The companies were located using online resources; a total of 75 companies were listed in the section, and 50 business representatives (66%) replied. To obtain a comprehensive understanding of process requirements, questionnaires were distributed to project managers, designers, production, and quality personnel.Additionally, we distributed the questionnaire to 60 businesses involved in the construction equipment industry's supply chain, which includes automotive, ancillary, and related heavy industry projects. Thus, we got input from fifty individuals representing forty-seven companies

Values of Feedback. (%)

SN	Fully Agrer	Partially Agree	Can't Say	Partially Disagree	Fully Disagree	Grand Total
1.	**50%**	**24%**	**2%**	**6%**	**0%**	**100%**
2.	**40%**	**36%**	**18%**	**6%**	**0%**	**100%**
3.	**44%**	**38%**	**18%**	**0%**	**0%**	**100%**
4.	**42%**	**34%**	**14%**	**10%**	**0%**	**100%**
5.	**42%**	**42%**	**16%**	**0%**	**0%**	**100%**
6.	**36%**	**44%**	**14%**	**6%**	**0%**	**100%**
7.	**40%**	**38%**	**18%**	**4%**	**0%**	**100%**

SN	Fully Agree	Partially Agree	Can't Say	Partially Disagree	Fully Disagree	Grand Total
1	25	12	10	3	0	50
2	20	18	9	3	0	50
3	22	19	9	0	0	50
4	21	17	7	5	0	50
5	21	21	8	0	0	50
6	18	22	7	3	0	50
7	20	19	9	2	0	50

7. Results (%)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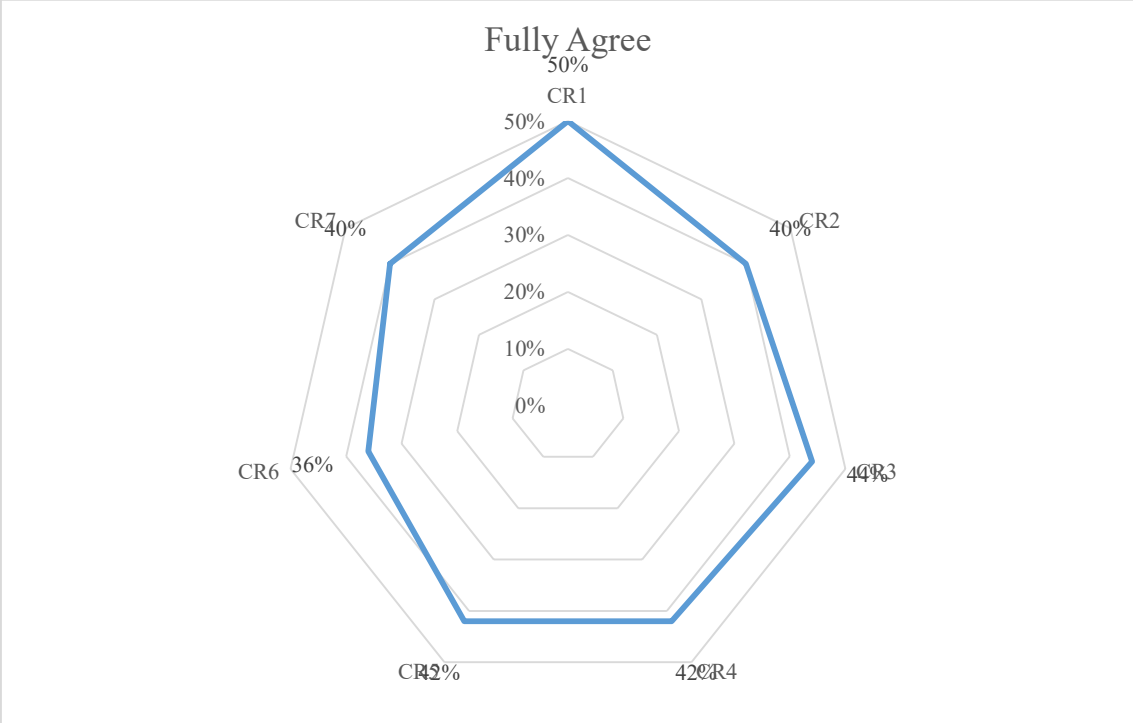
Q3
Q4
Q5
Q6
Q7
Fully Agree
Partially Agree
Can't Say
Partially Disagree
Fully Disagree



Actual penetration of these concepts in practice is overall average 42%. Still there is a huge scope for academicians and practitioners to come together for escalating this diffusion/ penetraions of concepts to next level.

8. Discussion –

Analysis Q1- The notion that each functional manager's active participation is crucial to the process of creating value is one that 50% of respondents fully agree with. Conversely, only 24% say they agree only partly. However, 20% cannot say for sure whether or not active participation is required, compared to 6% who disagree somewhat and 0% who disagree completely.

Analysis Q2- In terms of technical, process, and organizational changes, all respondents—40% in total and 36% in part—agree that empathy and mutual understanding are critical. These perspectives are shared with internal and external stakeholders in order to identify potential value in upcoming projects. Nevertheless, 6% of respondents disagree somewhat, 0% disagree completely, and 18% of respondents are unsure whether these adjustments are necessary.

Analysis Q3- Of the respondents, 44% completely believe that conceptualization of upcoming value generation is required, 38% partially agree, 18% cannot decide whether it is necessary, and 0% disagree, neither partially nor totally.

Analysis Q4- To develop a solid techno-commercial proposition from the idea of possible value generation, structured talks with external stakeholders are required. 42% of respondents surveyed totally agree, 34% slightly agree, and 14% are unsure about the necessity of the talks. 10% of those surveyed disagree in part, but not in full.

Analysis Q5- Survey respondents divided their opinions on the transformation plan of value creation into a formal techno-commercial contract with the client: 42% agreed entirely, 42% agreed partially, 16% couldn't decide, and 0% disagreed both partially and completely.

Analysis Q6- Value harvesting, which entails providing management with an extensive report on value creation and capture in order to continuously learn about the firm, was fully supported by 36% of respondents. On the other hand, 6% disagreed slightly, 0% disagreed totally, 14% did not say, and 44% just partially agreed.

Analysis Q7- 40% of respondents supported the value delivery as per the contract modification, which requires the business to carry out all contractual obligations. Of those, 38% partially agreed, 18% were unsure, 4% partially disagreed, and 0% entirely disagreed.

9. Conclusion

When it comes to mechanical engineering and building projects, value management has been shown to be an essential tool for improving productivity, quality, and final results. This study has examined the relevance and benefits of using value management ideas and techniques in the field of mechanical engineering. A close look at the four cornerstones of value management—information collecting, analysis, innovative problem-solving, and implementation—reveals that together they constitute a methodical framework for improving the mechanical engineering components of building projects. Value management facilitates the discovery of creative answers that save expenses, boost efficiency, and safeguard the future of an organization by combining the knowledge of all those involved.

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