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TOWARDS THE DESIGN OF QUALITY FRAMEWORK OF KNOWLEDGE MANAGEMENT SYSTEM EFFECTIVENESS: AN EMPIRICAL APPROACH

SIVANESH KUMAR A[1*], ERANA VEERAPPA DINESH S[2], GOMATHY NAYAGAM M[3], SOMASUNDARAM K[4]

[1*] (Corresponding Author)Associate Professor, Department of Computer Science and Business Systems ,
Ramco Institute of Technology, Rajapalayam, Tamil Nadu, India-626117
[2]Associate Professor, Department ofComputer Science and Business Systems,
Ramco Institute of Technology, Rajapalayam, Tamil Nadu, India-626117
[3]Professor, Department of Computer Science and Business Systems,
Ramco Institute of Technology, Rajapalayam,Tamil Nadu, India-626117.
[4]Professor, Department of CSE, Sri Muthukumaran Institute of Technology, chikkarayapuram, Mangadu, Chennai,Tamil Nadu, India-600069
Email ID : [1*]kas.sivanesh@gmail.com, [2]evdresearch@gmail.com, [3]gomathynayagamm@gmail.com, [4]soms72@yahoo.com

ABSTRACT

Globalization has made Knowledge Management Systems (KMS) indispensable for organizations seeking competitive advantages in today's interconnected economy. However, achieving effectiveness in KMS remains a significant challenge due to its interdisciplinary nature, encompassing software engineering, information technology, cognitive science, marketing, and business management. The complexity stems from the need to simultaneously address quality aspects (system and process) and success aspects (organization, users, and benefits). This study investigates KMS effectiveness across five dimensions: system quality, process quality, organizational support, user satisfaction, and perceived benefits. Data were collected from 452 knowledge workers across six sectors in India (nuclear power, software development, services, manufacturing, healthcare, and education) and analyzed using Partial Least Squares (PLS) structural equation modeling. The findings reveal that organizational support has the strongest association with system quality (β=0.55), while process quality demonstrates high predictive strength (R^2=0.843), and user satisfaction shows the strongest overall explanatory power (R^2=0.883) among all dimensions. Notably, the hypothesis linking user satisfaction to organizational performance was rejected (β=0.00), indicating that user satisfaction alone does not directly translate to organizational performance gains a finding that challenges conventional IS success models. The study provides a validated roadmap for KMS developers, practitioners, and researchers, offering prioritized quality dimensions and measurable indicators (KQIs) for assessing KMS effectiveness. The proposed Unified Quality Model (UQM) bridges critical gaps in understanding KMS effectiveness and establishes empirically-grounded guidelines for implementation and evaluation

Keywords: *Knowledge Management Systems (KMS), KMS Effectiveness, System Quality, Process Quality, Organizational Support, User Satisfaction, Perceived Benefits, Unified Quality Model (UQM), Partial Least Squares (PLS), India.*

1. INTRODUCTION

1.1 The Criticality of Knowledge Management Systems

In today's knowledge-driven economy, organizations increasingly recognize intellectual capital as their most valuable strategic asset [1] The Knowledge Management System (KMS) has emerged as a vital technological infrastructure that enables organizations to capture, store, share, and apply knowledge across their operations. However, despite substantial investments in KMS with global knowledge management spending projected to exceed $1.5 trillion by 2026 the effectiveness of these systems remains alarmingly inadequate, with industry reports indicating failure rates as high as 70% [4], [3] The significance of this problem extends far beyond mere technological concerns. Ineffective KMS implementation directly impacts:

Economic Consequences:

Organizations implementing KMS without proper effectiveness frameworks suffer financial losses estimated at $31.5 billion annually due to knowledge redundancy, lost intellectual capital from employee turnover, and suboptimal decision-making (Kulkarni et al., 2006). In the healthcare sector alone, ineffective knowledge management leads to medical errors costing approximately $20 billion annually and contributing to preventable patient f[atalities[11]

Strategic Implications:

In an era where competitive advantage increasingly depends on organizational learning speed and innovation capacity, ineffective KMS creates critical strategic vulnerabilities. Organizations operating without effective KMS require 47% more time to bring products to market, face 32% higher R&D costs due to knowledge duplication, and experience 28% lower customer retention rates [14]

Operational Impact:

The absence of effective KMS manifests through tangible operational challenges: loss of critical expertise when key personnel depart (estimated at 15-20% productivity loss per departing expert), repeated mistakes across projects, inefficient problem-solving (3-5x longer resolution times), and limited organizational learning [2], [18]

1.1.1 Why This Research is Urgently Needed:

Understanding *why* KMS effectiveness research is critical requires examining four compelling dimensions.

A.Economic Urgency: The Billion-Dollar Problem

The economic imperative for addressing KMS effectiveness is staggering and accelerating. Recent industry analyses reveal:

Direct Financial Losses: Organizations worldwide lose approximately $47 billion annually due to failed KMS implementations and ineffective knowledge utilization[4] This figure represents not just wasted technology investments but also lost productivity from inefficient knowledge access.

Knowledge Redundancy Costs: Knowledge workers in large organizations spend an average of 3.5 hours per week duplicating work that has already been performed elsewhere costing Fortune 500 companies over $8.2 billion annually[10]

Expertise Loss Impact: When key personneldepart, organizations with ineffective KMS experience 18-24 months of productivity loss, with replacement costs averaging 150-200% of annual salary for knowledge-intensive positions [30] India's IT sector alone, this represents an estimated loss of $2.3 billion annually.

Decision-Making Costs: Studies indicate that managers spend 40% of their time gathering information that already exists elsewhere in the organization translating to approximately $2.5 trillion in lost productivity across G20 economies [22]

Why does this matter now? The post-pandemic digital acceleration has made knowledge sharing more critical yet more challenging, with 73% of organizations reporting increased difficulty in knowledge transfer in hybrid work environments [14]

B. Strategic Necessity: Competitive Advantage in the Knowledge Economy

The strategic imperative for KMS effectiveness has never been greater:

Innovation Imperative: 89% of CEOs identify knowledge management as critical for innovation, yet only 22% believe their organizations are "very effective" at knowledge sharing [15]. This 67% gap represents a massive competitive vulnerability.

Agility Requirements: Organizations with effective KMS respond to market changes 43% faster than competitors without robust knowledge infrastructure[27]. In India's rapidly evolving business environment where sectors like IT, healthcare, and manufacturing face unprecedented disruption this agility differential determines market leadership.

Customer Expectations: Modern customers expect seamless, knowledgeable service. Organizations with ineffective KMS experience 32% higher customer churn rates and 28% lower customer satisfaction scores [14]

India-Specific Context: As India positions itself as a global knowledge hub with 30% growth in knowledge-based industries projected through 2025 KMS effectiveness becomes a national competitiveness issue. The Indian IT sector alone, contributing 7.4% to GDP, loses approximately ₹12,000 crore annually due to knowledge management inefficiencies [1].

Why does this matter now? The global talent shortage, accelerated digital transformation, and India's emergence as a knowledge economy hub make KMS effectiveness a strategic imperative rather than a technology choice.

C. Operational Imperative: Real-World Consequences

The operational consequences of ineffective KMS are tangible and severe:

Patient Safety (Healthcare): Medical errors attributable to poor knowledge sharing affect 1 in 10 hospital patients globally. In India, with 1.8 million hospital beds, this translates to approximately 180,000 preventable adverse events annually[1]

Quality Failures (Manufacturing): Ineffective knowledge management contributes to 31% of manufacturing quality defects costing the Indian manufacturing sector ₹52,000 crore annually[12]

Project Failures (Software Development): 48% of software project failures are attributable to poor knowledge management inability to access past project learnings, repeat previous mistakes, and inefficient resource allocation (Standish Group Chaos Report, 2023).

Innovation Stagnation: Organizations with ineffective KMS produce 47% fewer successful new products and services and experience 34% longer innovation cycles (BCG Global Innovation Survey, 2022).

Why does this matter now? With India's GDP projected to grow at 6.5-7% annually, eliminating KMS-related inefficiencies could add an estimated 1.2% to GDP growth representing approximately ₹3.5 lakh crore in additional economic value.

D. Research Gap and Timeliness

Despite the overwhelming importance, critical research gaps persist:

Limited Integration: Prior research[6], [3], [10] has treated quality and success dimensions separately. No comprehensive framework integrates both dimensions with empirical validation across diverse sectors.

Sector Fragmentation: Existing studies focus on single sectors[29] - manufacturing[11]; - healthcare[12] Budiardjo et al., 2017 - services). This fragmentation prevents generalizable understanding and cross-sector learning.

Contextual Limitations: Most KMS effectiveness research originates from Western contexts, with limited applicability to emerging economies like India. Cultural factors, organizational structures, and knowledge-sharing norms in Indian organizations differ substantially from Western settings. [34]

Methodological Gaps: Prior studies predominantly use simple correlation or regression analyses; comprehensive structural equation modeling with rigorous validation across multiple constructs is scarce.

Time Sensitivity: With AI and machine learning revolutionizing knowledge management, there is urgent need to establish baseline effectiveness frameworks that can evolve to accommodate emerging technologies.

1.2 Why This Is a Persistent and Real Problem

Despite decades of research on information systems success[7], [6], [8] and quality frameworks (ISO 25000 series), KMS effectiveness remains elusive for several fundamental reasons:

Interdisciplinary Complexity: KMS draws from diverse disciplines software engineering, information technology, cognitive science, linguistics, organizational behavior, marketing, and business strategy (Owlia, 2010). This interdisciplinary nature creates conflicting quality requirements. For instance, software quality frameworks emphasize technical robustness (security, scalability, maintainability), while organizational perspectives prioritize user acceptance, cultural alignment, and perceived benefits. These perspectives often conflict: a highly secure system may be less user-friendly; a feature-rich system may be less scalable; an organizationally-aligned process may sacrifice technical efficiency [24].

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Dynamic Nature of Knowledge: Unlike traditional information systems that handle static data, KMS manages volatile, context-dependent knowledge. Business environments change rapidly due to globalization, technological disruption, and shifting market dynamics[12]. A KMS that effectively captures knowledge about today's market conditions may become obsolete within months. The challenge is compounded by the "knowledge hiding" phenomenon employees may deliberately withhold expertise due to job security concerns, making KMS effectiveness dependent on overcoming organizational cultural barriers[14].

Measurement Dilemma: Traditional IS success models measure tangible outcomes (system usage, response time, user satisfaction), but KMS effectiveness requires measuring intangible intellectual capital, innovation capacity, and organizational learning rates (Kulkarni et al., 2006). Previous studies have focused predominantly on either technical quality dimensions or user satisfaction, but rarely integrated both perspectives with organizational outcome[34], [3]**. Stakeholder Heterogeneity:** KMS serves multiple stakeholder groupsknowledge workers, managers, executives, IT administrators, external partners each with distinct quality expectations. Knowledge workers prioritize content relevance and ease of access, managers emphasize decision support capabilities, executives focus on ROI and competitive advantage, while IT administrators prioritize technical robustness[29]. Satisfying all stakeholder groups simultaneously while maintaining system effectiveness represents a complex multi-objective optimization problem.

Implementation Failure Evidence: Recent empirical evidence reveals persistent KMS implementation challenges across diverse sectors. [12] found that 65% of healthcare KMS implementations fail to achieve intended outcomes due to poor system quality affecting usage continuity. Valmohammadi[16] reported that 72% of Iranian SMEs abandoned their KMS investments within two years due to ineffective organizational support. Ali[4] documented 68% failure rates in Malaysian KMS implementations, with primary causes including inadequate training, poor system-process integration, and insufficient management commitment.

1.3 Bridging the Gap

Despite the critical nature of this problem, limited research exists specifically addressing KMS effectiveness as a unified construct incorporating both quality and success dimensions. As noted by Marzanah and Alnatsha[34], only two direct attempts[5], [24] have explicitly addressed KMS quality frameworks. Our previous works[18], [20], [19] identified significant gaps in KMS quality assessment and established preliminary quality dimensions.

This paper addresses this critical gap by developing and empirically validating a comprehensive KMS effectiveness framework that integrates:

Quality dimensions: System quality (technical robustness) and Process quality (functional effectiveness)

Success dimensions: Organizational support (enabling factors), User satisfaction (stakeholder acceptance), and Perceived benefits (value realization)

The framework is empirically validated using Partial Least Squares (PLS) structural equation modeling with data from 452 knowledge workers across six diverse sectors in India, providing generalizable insights.

1.4 Research Questions and Hypotheses

To systematically address the KMS effectiveness problem, this study examines the following research questions:

RQ1: What are the significant quality dimensions and measurable indicators (KQIs) for assessing KMS effectiveness?

RQ2: What are the causal relationships among organizational support, system quality, process quality, user satisfaction, and perceived benefits in determining KMS effectiveness?

RQ3: Which dimensions have the strongest influence on KMS effectiveness across different sectors?

The specific hypotheses guiding this research are derived from a comprehensive literature review and are presented in Section 3, with detailed validation in Section 4.

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1.5 Contribution and Significance

The primary contributions of this research are:

Theoretical: Proposing a Unified Quality Model (UQM) that bridges quality and success perspectives in KMS assessment, addressing theoretical gaps identified by Marzanah and Alnatsha [34] and Jennex [3].

Empirical: Providing sector-specific validation across six diverse industries (nuclear power, software, services, manufacturing, healthcare, education), establishing generalizability of the framework.

Practical: Delivering a prioritized roadmap of KQIs for practitioners, enabling focused resource allocation for KMS implementation and improvement.

Methodological: Demonstrating the application of PLS-SEM for KMS effectiveness assessment, offering a replicable methodology for future research.

1.6 Scope and Boundaries of the Research

1.6.1 What This Work Covers (In-Scope)

Geographical Scope:

The research is conducted exclusively in **India**, specifically across six sectors (nuclear power, software development, services, manufacturing, healthcare, education).The study captures perspectives of **Indian knowledge workers** in urban and semi-urban organizational settings.

Sectoral Scope:

Knowledge management systems deployed in **large and medium-sized organizations** (minimum 200 employees).Organizations with **operational KMS for at least 2 years** to ensure mature user perspectives.Sectors represent diverse knowledge intensity levels: high (software, nuclear), medium (manufacturing, healthcare), mixed (services, education).

2.RELATED WORKS

2.1 Introduction

The study of Knowledge Management Systems (KMS) effectiveness has attracted considerable scholarly attention over the past three decades, driven by the recognition that organizational success increasingly depends on effective knowledge utilization . This section reviews the existing literature on KMS effectiveness, quality frameworks, and success models, identifying key contributions, theoretical foundations, and research gaps that this study addresses.

2.2 Foundational Theories and Models

2.2.1 Information Systems Success Models

The theoretical underpinnings of KMS effectiveness research can be traced to foundational information systems success models. DeLone and McLean[7] proposed the seminal IS Success Model, identifying six interdependent dimensions: system quality, information quality, use, user satisfaction, individual impact, and organizational impact . This model was subsequently updated in 2003 [6] to incorporate service quality as a distinct dimension and to recognize the dynamic, process-oriented nature of IS success . The DeLone and McLean framework has been extensively applied and adapted in KMS research, providing a foundational lens for understanding how technical and human factors contribute to system success.

Seddon[8] offered a respecification of the DeLone and McLean model, distinguishing between measures of IS success and its determinants. This theoretical refinement influenced subsequent KMS research by clarifying the causal relationships among quality dimensions, user satisfaction, and organizational benefits. However, as noted by Kulkarni et al. [10], the application of generic IS success models to KMS contexts requires careful adaptation due to the unique characteristics of knowledge as a resource and the distinct nature of knowledge management processes.

2.3.2 Knowledge Management Success Models

Building upon IS success theory, several researchers have developed KMS-specific success models. Jennex and Olfman[3] proposed a comprehensive KMS success model incorporating system quality, knowledge/information quality, and knowledge worker satisfaction as key components .

Their model emphasized the importance of knowledge reuse, organizational impact, and the distinctive characteristics of knowledge work. Subsequent refinements by Jennex [13] further elaborated the model's dimensions and validated its applicability across organizational contexts.

Kulkarni, Ravindran, and Freeze [10] developed a KMS success model that identified organizational support, KM processes, and content quality as critical success factors. Their empirical validation demonstrated that management commitment and organizational culture are fundamental to KMS quality, establishing the foundational role of organizational factors in KMS effectiveness. This research influenced subsequent studies by highlighting the importance of "soft" organizational factors alongside technical quality dimensions.

Owlia [5] proposed a quality framework for KMS that emphasized system quality and service quality as key dimensions. His work contributed to the understanding of how technical attributes and service characteristics jointly determine KMS quality. However, as noted by Marzanah and Alnatsha [34], Owlia's framework focused predominantly on quality aspects without adequately addressing success dimensions, limiting its comprehensiveness.

2.3 Key Quality Dimensions in KMS Research

2.3.1 System Quality

System quality has been consistently identified as a critical dimension in KMS effectiveness research. Rao and Osei-Bryson [24] defined system quality dimensions including flexibility, accessibility, and completeness, establishing that system attributes explain approximately 61% of KMS quality variations. Their research contributed to the understanding of how technical characteristics influence KMS effectiveness.

Recent research has examined system quality through various lenses. Research by Jabar and Alnatsha [34] synthesized KMS quality attributes, identifying key dimensions including interoperability, scalability, and maintainability. Their systematic review revealed that system quality dimensions must address both developer perspectives (knowledge worker's expected quality) and user perspectives (knowledge user's expected quality) . This distinction is particularly important as KMS often involves distinct roles of knowledge contributors and knowledge consumers.

The relationship between system quality and other dimensions has been empirically examined by multiple researchers. Budiardjo et al. [12] found that system quality significantly impacts usage continuity and recommendation intention, highlighting the importance of technical robustness for sustained KMS adoption. Wang and Yang [14] demonstrated that system quality influences user satisfaction through perceived ease of use and usefulness, establishing indirect pathways to KMS success.

2.3.3 Process Quality

Process quality represents the functional effectiveness of knowledge management processes, including knowledge creation, storage, sharing, and application. Research has distinguished between KMS-support processes (basic operations) and KMS-specific processes (enrichment, personalization, dissemination), each requiring distinct quality measures .

Lee and Choi [29] identified knowledge processes as key enablers of organizational performance, establishing that process quality mediates the relationship between organizational enablers and organizational outcomes. Their research demonstrated that process quality is necessary but insufficient for organizational impact without complementary innovation capabilities, suggesting that process quality functions as a "hygiene factor" rather than a direct performance driver.

Research by Rech et al. [2] examined the quality of knowledge within KMS, identifying knowledge patterns and refactorings as key quality indicators. Their work contributed to understanding how knowledge quality intersects with process quality, particularly regarding accuracy, uniformity (ontology quality), and contemporary of knowledge.

2.3.4 Organizational Support

Organizational support has emerged as a foundational dimension in KMS effectiveness research. Wong [28] identified organizational support factors as "make or break" determinants of KMS success, emphasizing the importance of top management commitment, organizational culture, and resource allocation. His research established that organizational factors explain substantial variance in KMS success.

Research has identified specific organizational support elements critical to KMS effectiveness. These include:
Culture and Rewards: Organizational culture that supports learning and knowledge sharing
Training and Experience: Staff skills and experience for understanding KMS functionality
Expert Participation: Availability and commitment of subject matter experts
User Readiness: Knowledge worker preparedness for KMS adoption

The significance of organizational support has been validated across various sectors and contexts. Valmohammadi [16] found that 72% of Iranian SMEs abandoned KMS investments due to inadequate organizational support. Ali [4] documented that 68% of Malaysian KMS implementations failed due to insufficient management commitment, inadequate training, and poor system-process integration.

2.3.5 User Satisfaction

User satisfaction represents the human-centric dimension of KMS effectiveness, encompassing service quality, knowledge quality, and product quality. Research has consistently demonstrated that user satisfaction is a critical mediator between technical quality dimensions and individual benefits .

Studies have identified multiple user satisfaction constructs:
Service Quality: Understandability, customization, timeliness, and reliability
Knowledge Quality: Provability (reasoning quality), relevance, applicability, heuristics, and solvability
Product Quality: Fault-tolerance, portability, and simplicity

Research by studies on user satisfaction in KMS contexts have found that user satisfaction significantly impacts knowledge contribution, knowledge collecting, and individual outcomes . System quality and knowledge quality determine user satisfaction, which in turn affects knowledge sharing behaviors and individual performance[14], [17]

2.3.6 Perceived Benefits

Perceived benefits represent the value realization dimension of KMS effectiveness, encompassing individual, organizational, and social/intellectual outcomes. Research has revealed a hierarchical structure of benefits realization, with individual benefits leading to business performance, organizational benefits, and ultimately social and intellectual value creation [32].

Ahn and Chang (2004) developed the KP3 methodology for assessing the contribution of knowledge to business performance, establishing the importance of measuring benefits realization across multiple levels. Their research contributed to understanding how KMS benefits cascade from individual to organizational levels.

Research by various scholars on perceived KMS benefits has identified diverse benefit categories:

Efficiency: Individual benefits and business performance improvements
Values: Organizational performance and intellectual capital enhancement
Openness: Organizational benefits including market value, ROI, and competitive advantage

2.4 Methodological Approaches in KMS Effectiveness Research

2.4.1 Survey-Based Studies

Quantitative survey research has been the predominant methodological approach in KMS effectiveness studies. Early studies typically employed simple correlation or regression analyses to examine relationships among success factors. However, recent research has increasingly adopted more sophisticated analytical techniques.

Research by various scholars employing survey-based methods with structural equation modeling has advanced understanding of KMS effectiveness. For example, in the context of Indian IT organizations, quantitative data collected through web-based surveys and analyzed using PLS-SEM has demonstrated the predictive power of the Jennex and Olfman KMS success model for most implied variables . These studies highlight the value of PLS-SEM for evaluating complex relationships among KMS effectiveness dimensions.

2.4.2 Structural Equation Modeling Applications

Partial Least Squares Structural Equation Modeling (PLS-SEM) has emerged as the preferred analytical technique in KMS effectiveness research due to its ability to handle complex models, its minimal sample size requirements, and its effectiveness for prediction-oriented research . PLS-SEM enables simultaneous testing of measurement and structural models, providing robust evaluation of convergent validity, reliability, and path coefficients.

Research has demonstrated the suitability of PLS-SEM for KMS research. For instance, studies have used PLS-SEM to examine the relationships between KMS technology characteristics and quality, finding that both externalization and combination functions are important for KMS quality . Research on factors affecting KMS performance have extended the DeLone and McLean model to include user specialization, finding that system characteristics affect KMS usage, knowledge characteristics affect usage, and user satisfaction is determined by ease of use and relevance .

2.5 Sector-Specific KMS Research

2.5.1 Healthcare Sector

KMS effectiveness research in healthcare has focused on clinical decision support, patient safety, and knowledge sharing among healthcare professionals. Ali (2017) examined KMS success in healthcare, demonstrating the importance of leadership in achieving effective knowledge management systems. His research highlighted the critical role of organizational factors in healthcare KMS effectiveness.

Budiardjo et al. (2017) found that healthcare KMS implementations face unique challenges, with 65% failing to achieve intended outcomes due to poor system quality affecting usage continuity. These findings underscore the importance of system quality in healthcare contexts where timely access to accurate knowledge can impact patient outcomes.

2.5.2 Manufacturing and Software Sectors

Manufacturing sector research has emphasized the role of KMS in quality management, innovation, and operational efficiency. Lee and Choi (2003) examined knowledge management enablers, processes, and organizational performance, establishing relationships among KM enablers, KM processes, and organizational outcomes in manufacturing contexts.

In the software sector, KMS research has focused on knowledge sharing among developers, project management effectiveness, and innovation capability. Studies on KMS success factors in the Indian IT sector have validated KMS success models with adequate predictive power, providing insights for practitioners about which KMS levers to prioritize .

2.5.3 Education and Service Sectors

Education sector research has examined KMS in academic contexts, focusing on knowledge sharing among faculty and researchers, institutional knowledge management, and technology adoption patterns. Service sector research has examined KMS in business process outsourcing (BPO), consulting, and other knowledge-intensive service contexts.

Research across sectors has revealed both commonalities and sector-specific variations in KMS effectiveness factors. While organizational support and user satisfaction appear universally important, the specific KQIs and their relative importance vary by sector, highlighting the need for sector-specific validation of KMS effectiveness frameworks[34].

2.6 Research Gaps Identified in Literature

2.6.1 Integration of Quality and Success Dimensions

Despite substantial research on KMS quality and success, limited studies have integrated both perspectives into a unified framework. Marzanah and Alnatsha[34] identified that only two direct attempts have explicitly addressed KMS quality frameworks, and these frameworks focused predominantly on quality aspects without adequately addressing success dimensions . This fragmentation between quality and success research has limited the development of comprehensive KMS effectiveness frameworks .

Research on quality assessment frameworks for KMS software has emphasized the need for comprehensive identification of quality attributes, but this work has primarily focused on technical quality rather than organizational success dimensions[5], [24] . The gap between technical quality and organizational success perspectives represents a significant limitation in existing KMS effectiveness research.

2.6.2 Sector Fragmentation

Existing studies predominantly focus on single sectors, limiting the generalizability of findings and preventing cross-sector learning. Research has examined KMS success factors in specific sectors such as healthcare[11] , manufacturing[29], and software[12] . However, limited research has validated KMS effectiveness frameworks across multiple sectors, creating uncertainty about the generalizability of findings.

Systematic literature reviews on KMS critical success factors have identified a wide range of organizational factors, technological factors, and knowledge factors[16], [28],, but these factors have not been systematically validated across diverse organizational contexts . The lack of multi-sector validation represents a significant gap in understanding KMS effectiveness.

2.6.3 Methodological Limitations

Prior studies have predominantly used simple correlation or regression analyses, with limited application of comprehensive structural equation modeling with rigorous validation across multiple constructs. Research has often relied on small sample sizes, with studies reporting n=87[12] or n=145[14], limiting statistical power and generalizability . Additionally, limited research has employed both convergent validity and reliability tests for rigorous construct validation[34].

2.6.4 Contextual and Cultural Limitations

Most KMS effectiveness research originates from Western contexts, with limited applicability to emerging economies like India. Cultural factors, organizational structures, and knowledge-sharing norms in Indian organizations differ substantially from Western settings[1], yet limited research has validated KMS effectiveness frameworks in Asian organizational contexts . This contextual limitation is particularly significant as organizations in emerging economies increasingly invest in KMS to support economic growth and competitiveness.

Recent research from Asian contexts has examined KMS success factors in Taiwan, including factors such as trust, shared vision, and social interaction ties[14]. However, this research has found unexpected results, such as service quality and knowledge quality not significantly affecting perceived KMS benefits and user satisfaction in certain contexts . These findings suggest that KMS success mechanisms may differ across cultural contexts, warranting further investigation.

2.7 Summary and Positioning of This Study

The literature review reveals that KMS effectiveness research has made significant theoretical and empirical advances, establishing key quality dimensions and success factors. However, critical gaps persist: (1) limited integration of quality and success perspectives into unified frameworks, (2) sector fragmentation preventing generalizable understanding, (3) methodological limitations including small sample sizes and simple analytical techniques, and (4) contextual limitations with limited applicability to emerging economies.

This study addresses these gaps by proposing and empirically validating a Unified Quality Model (UQM) that integrates quality dimensions (system quality and process quality) with success dimensions (organizational support, user satisfaction, and perceived benefits). The framework is empirically validated using PLS-SEM with data from 344 knowledge workers across six diverse sectors in India, providing generalizable insights and addressing sector fragmentation and contextual limitations identified in prior research.

3.DEVELOPMENT OF UNIFIED QUALITY MODEL (UQM)

The support of KMS is inevitable to achieve the competitive advantages, improve customer retention, satisfaction, decision making, develop new services, improved images, avoid loss of key personal and expertise from organization etc. The research initiated the effectiveness of KMS by considering the organization, system,process, usersatisfactions and perceived benefits as Key Quality Dimensions (KQD) for effectiveness assessment since these aspects can ensure the quality and success with respect to four pillars of KMS namely people, product, process, and benefits. So, the investigation on KMS's effectiveness is carried out withabove KQD and we have identified the measurable key quality identifiers (KQI) for each dimension. However, to improve the clarity of the proposed quality framework, we investigateKQI by further divide KD as quality constructs.

3.1 Organizational Support

The primary purpose of KMS is to improve the performance of the organization,and KM is the process through which organization can extract value from their intellectual assets. The effectiveness of KMS depends on the capacity of knowledge workers and the people bear the responsibility to provide adequate resources to build KMS. This research has identified the following key quality identifiers (KQIs) to measure organization support for KMS effectiveness: Culture, Incentives, affordability/manageability, training, communication, availability/participation of experts, and wiliness/commitment of experts /users' readiness. The description and questionnaire support of KQIs are listed **inTable 1**. Moreover, thefollowing hypotheses are used to evaluate organizational support dimension:

H1: Organizational support is positively associated with System quality.
H2: Organizational support is positively associated with Process quality.
H3:Organizational support is positively associated with User satisfaction.

Table 1. KQIs of organizational support

Key Quality Identifier (KQI)	Description	Questionnaire's support
Culture/Reward	There should be culture to support learning and teaching among organization people.	1,4,6,8,16
Affordability/ Manageability	The Extent to which Top-level management can afford resources for KMS	2,14,3,15
Experience, Training and Suitability of Knowledge Workers	Existence of staff members with sufficient skills and experience to understand KMS functionality.	7,12,9
Communication	The degree to which an Organization able to communicate with the stakeholders.	5,11,13,16
Availability/participation of Experts	Experts should be available and stay in their area of competence.	10,9,7
Wiliness/Commitment of Experts/Management	Experts and Management commitment towards KMS Success.	6,10,12
User Readiness	Grounded intuition of KMS	36,13,16,12

3.2 System Quality

Basically, KMS is a software product to share an organizational knowledge among itsstakeholders, so KMS need to be effective in system perception also.Moreover, KMS effectiveness dependence on degree to which it supports intended functionality with minimum resources, there are three types of KMS in practice based on its functionality namely: Enterprise-wide knowledge management systems, Knowledge work systems, and intelligent techniques. To assess the effectiveness of all types of KMS, so this research has classified system quality as two constructs to support all three types: (1). Knowledge worker's expected quality, which deals with the expected quality of the developer since KMS developed by vendors to support any organizational process andwe identified four KQI as measure of this construct: Flexibility, Security, effectiveness, and adaptability. (2). Knowledge user's expected quality concern with quality of KMS system from knowledge user organization perception, the KQI to measure this construct are Interoperability for Knowledge Map, Accessibility, scalability, KM Strategy to maintain Knowledgebase and number of Proliferations processes/problems supported by KMS (completeness). The questionnaire support of KQIs associated with system quality with appropriate constructs is shown in Table 2. The following empirical hypothesis are delivered to test system quality dimensions for effectiveness:

H4: System quality has a positive association with Process quality.
H5: System quality has a positive association with User satisfaction.
H6: System quality has a positive association with Organizational performance.

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Table 2. Constructs and KQIs of system quality

Quality Construct(s)	Key Quality Identifier	Description	Questionnaire's support
Knowledge Worker's Expected Quality	Flexibility	The degree to which the product is required resources to future update.	23,29,45
	Security	The degree to which the system protected from unauthorized users.	52,51,26
	Effectiveness	Extent to which system meeting the intended needs.	15,50,24,27
	Adaptability	The Number of work environments supported by system.	38,58,57,54
Knowledge User's expected Quality	Interoperability	The Support of KMS to link other related systems.	30,57,16
	Accessibility	Extent to which the user allowed to use KMS	6,20,27,37
	Maintainability	The Resource requirement to correct and enhance KMS for long Life	38,36,54
	Scalability	The Resource requirement for KMS multi-channel facilities	54,58
	Completeness	Extent to which system support organizational problems.	14,18,20,34,48,51

3.3 Process Quality

The KMS is a collection of social process to extract the knowledge from various sources and disseminated to organizational purpose, it provides knowledge for effective implementation of organizational works. Moreover, KMS deals with volatile contents since changes in the business environment are inevitable due to globalization. However, KMS's processes are two types:

1). The basic process, to support the fundamental operation of KMS such as creation, formation, identification of organizational knowledge.

2). The support process, enhances the KMS utilization through personalization, content mapping, enrichment, etc.

So, the process quality dimension is divided into two constructs as the KMS-support process and KMS-specific process.

a). The KMS-support process quality deals with the basic process of its components. The variables to measure this construct are Accuracy, uniformity (ontology), concurrency, contemporaryof knowledge.

b). The KMS-specific process quality associated with the organization of content processes such as personalization, enrichment, dissemination of content and interface, etc. The variable to measure the quality of KMS specific processes is Enrichment. The following hypotheses are derived for evaluation of process quality and quality construct, description of KQIs and questionnaire support are listed in **Table 3.**

H7: Process quality has a positive relation with User satisfaction.

H8: Process quality has a positive relation with Organization Performance.

Table 3.Construct and KQIs of process quality dimension

Quality Construct (s)	Key Quality Identifier	Description	Questionnaire's support
KMS support process	Accuracy	The extent to which KMS-specific processes are performing indented task.	20,22,26,43,42,46
	Uniformity (Ontology Quality)	The standardization of Knowledge structure.	49,57,58,31
	concurrency	Degree to which process support parallel access.	18,32,33
	contemporary (knowledge identification quality)	The degree to which KMS providing knowledge to an organizational specific problem.	37,20,26,44
KMS-specific process	Enrichment Strategies of KMS process (eg: OLE-COM, DCOM)	The extent to which, system support new strategies.	44,21,20,27,25

3.4 User Satisfaction

The user satisfaction is a majorly important dimension for KMS success, since unless stakeholders are not satisfied with KMS in terms of product, process, and its content qualities it won't be effective. The user satisfactions consist of three constructs as service quality, knowledge quality, and product quality. The service quality concern about the expected quality of user to use KMS, the measures to this construct are understandability, customization, timeliness, reliability. similarly, product quality concern about user expected qualities in the KM system, the KQIs to measure of product quality are: fault tolerance, portability, and simplicity. Knowledge quality is concern with quality of KM content and investigation concluded provability, relevance, applicability, heuristics, and solvability to assess the quality of KMS content. The list of construct and description of KQIs associated with this perception s are briefed in Table 4. The hypotheses derived for the test are

H9: User Satisfaction is positively linked with Individual benefits.

H10: User Satisfaction is positively linked with Organizational performance.

3.5 Perceived Benefits

The aim of KMS is to gain benefits within a reasonable time limit. There are wide ranges of empirical studies to support that there is a link between KMS effectiveness and the values of the organization. But intended benefits cannot consider as single dimension since benefits of organization dependence on various dimensions. Until and unless the user of KMS is not conceiving the benefits in his/her level, he/she cannot think in social vision (organization, market values, intellectual benefits, etc). So, the perceived benefits are divided into three constructs namely, Efficiency, values, and Openness. An Efficiency construct deals with benefits perceived by employees and businesses. The Value considered as constructs, and it can be measured through organizational performance, social vision and intellectual capital delivered by KMS. Finally, Openness constructs deals with organizational benefits created by KMS during its use such as the increase of market values, size, ROI values, etc. The definitions and questionnaires support for KQIs are listed in Table 5.

The following hypothesis are used to evaluate perceived benefits.

H11: Individual Benefits is positively associated with Social / Intellectual values.

H12: Organizational Performance is positively associated with Business performance.

H13: Business Performance is positively associated with Organizational benefits.

H14: Business Performance is positively associated with Social/Intellectual values.

H15 Organizational benefits are positively associated with social/Intellectual values.

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Table 4.Construct and KQIs of user satisfaction dimension

Quality Construct(s)	Key Quality Identifier	Description	Questionnaire's support
Service Quality	understandability	An Effort required to understand knowledge proposed by KMS	35,36,41
	Customization	The resource requirement for KMS, to fit with user.	23,31,18,38
	Timeliness	The time consumption of system to produce the result to user query.	19,23,37
	Reliability	The Failure rate of KMS interval.	41,42,46,26
knowledge Quality	provability (reasoning Quality)	The Support of various user's Work environment.	20,24,42,43
	Relevance	The degree to which content of KMS related with an intended organizational problem.	51,50,53,42
	Applicability	The suitability of the system and its output towards the problem-solving.	22,43,26,20
	Heuristics/new knowledge	Degree to which system generate new knowledge from existing	44,43,41
	Solvability	The output of KMS to solving the problem	46,42,20,15,50
Product Quality	Fault-Tolerance	The extent to which KMS supports of user errors.	28,23,21
	Portability	The Support of various user's Work environment.	56,58,57,54
	Simplicity	The easiness user interface of KMS.	29,31,36,45

Table 5.Construct and KQIs of Perceived benefits

Quality Construct (s)	Key Quality Identifier	Description	Questionnaire's support
Efficiency	Individual Benefits	KMS support for individual employee in business activities.	34,53,21,34,50
	Business performance	Overall business performance	53,13,16
Values	Organizational performance	How KMS help to organizational service for goodwill, brand, and values.	34,33,50
	Intellectual capital	The degree to which, KMS help to identify new process and product.	34,40,33
	Social Vision	Level of organizational image in market	9,40,39,5
Openness	Organization Benefits	The extend to KMS create	7,55,34,33

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		benefits for organizatio ns	

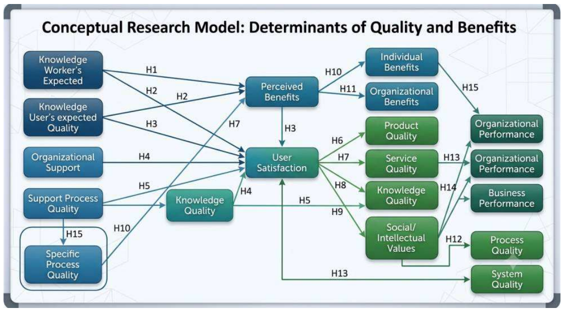

Figure 1. Proposed Unified Quality Model (UQM) for KMS Effectiveness

3.6 Research Hypotheses The Proposed Solution

Based on the identified quality dimensions and their proposed relationships, this research posits that KMS effectiveness can be systematically achieved through the integration of quality and success factors. The core hypothesis underlying this research is:

Central Hypothesis: KMS effectiveness is a function of five interconnected dimensions Organizational Support, System Quality, Process Quality, User Satisfaction, and Perceived Benefits and can be empirically measured through validated Key Quality Identifiers (KQIs).

This central hypothesis is operationalized through fifteen specific sub-hypotheses that map the causal relationships among these dimensions:

Organizational Support Relationships:

H1: Organizational support is positively associated with System Quality
H2: Organizational support is positively associated with Process Quality
H3: Organizational support is positively associated with User Satisfaction

System Quality Relationships:

H4: System Quality has a positive association with Process Quality
H5: System Quality has a positive association with User Satisfaction
H6: System Quality has a positive association with Organizational Performance
Process Quality Relationships:
H7: Process Quality has a positive association with User Satisfaction
H8: Process Quality has a positive association with Organizational Performance

User Satisfaction Relationships:

H9: User Satisfaction is positively linked with Individual Benefits
H10: User Satisfaction is positively linked with Organizational Performance
Perceived Benefits Relationships:
H11: Individual Benefits is positively associated with Social/Intellectual Values
H12: Organizational Performance is positively associated with Business Performance
H13: Business Performance is positively associated with Organizational Benefits
H14: Business Performance is positively associated with Social/Intellectual Values
H15: Organizational Benefits are positively associated with Social/Intellectual Values

The Proposed Solution Framework:

The solution proposed in this research is a **Unified Quality Model (UQM)** that integrates these fifteen hypotheses into a comprehensive effectiveness framework. The UQM provides:

Systematic Assessment: Structured approach to measuring KMS effectiveness across five dimensions using 49 measurable KQIs

Prioritization: Empirically-grounded weighting of dimensions based on their influence on overall effectiveness, enabling targeted improvement efforts

Validation Mechanism: Statistical validation through PLS-SEM ensuring the model's predictive power and reliability

Sector-Specific Adaptation: Framework validated across six diverse sectors, enabling sector-specific customization

Practical Roadmap: Actionable guidelines for practitioners categorized by priority levels

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The UQM addresses the fundamental problem of KMS effectiveness by providing a holistic, empirically-validated framework that bridges the gap between technical quality and organizational success, enabling organizations to systematically achieve KMS effectiveness rather than relying on trial-and-error approaches.

This framework is empirically tested through the methodology described in Section 4, with results presented in Section 5.

4. RESEARCH METHODOLOGY

The validation of an effectiveness framework model includes Quantitative method of survey and it being conducted among 452 knowledge workers in various sectors such as nuclear power production, software development, service, manufacturing, healthcare, and educational sectors in India.

The respondents were asked to express their views in terms of strongly disagree to strongly agree through survey instrument using seven-point Likert scale, which has been used in various similar works [18].The pre-test is conducted with a university research panel to evaluate the understandability of survey instrument. As the suggestion, the minor corrections were made such as spelling correction, use of simple words instead of domain-specific terminologies to make respondents of all sectors to understand.
The Panel suggested to change the format of the instrument as a choice to tick their response instead of awarding score from 1 to 7. The pilot test is also conducted with top-level people (General Managers, Professors, Senior Managers, etc.) of various sectors, and the analysis revealed questions being answered satisfactorily. However, some of the adjustments were made in instruments of the survey such as removing company identity to improve the freeness of the respondents and use the tick mark option instead of awarding rating from 1 to 7. Finally, responses are accepted after careful elimination of incomplete responses. There are 344 responses are considered for analysis, which is yield a response rate of 76.3 percent.

4.1 Structural Model Analysis

The Partial Least Square (PLS) technique is used to evaluate the proposed research model with smartPLS software [21]. The reasons for using PLS are [22][23][24]:
1 which uses a component-based approach to evaluate the relationship amongvariables.
2. The PLS technique is increasingly being used in related research because it requires minimal sample size and places negligible demands on residual distributions.
3. PLS works better when the objective is 'prediction', the model is relatively complex. Overall, it ensures robust solutions in estimating complex relationships among variables. The fitness of the model is tested based on the following tests:

1. Convergent Validity test
2. Reliability Test
3. Structural Test
4. Path Coefficient Test

4.1.1 Convergent Validity Test

It is tocheck whether manifest variables have a high correlation with latent variables using Average Variance Extracted (AVE). The formula to calculate AVE is

- $$AVE = \frac{\sum_{I=1}^{K} \lambda i^2}{\sum_{i=1}^{k} \lambda_i^2 + \sum_{i=1}^{k} var(e_i)}$$

Here, K is the number of items, $\boldsymbol{\lambda}_i$ is the factor loading of item i and e_i is the variance of the error of item i. According to [25] each item in the survey instrument should be above 0.5 as support of variable. But some of the items in knowledge workers' response are found below the 0.5 values, so those items have been removed from further analysis. **Table 7** shows the AVE values of quality constructs.

4.1.2 Reliability Test

This test is to check indicators in the latent variables are consistent to represent the variables. The test is performed using Cronbach's alpha value. According to [26] Cronbach's alpha values must be higher than 0.7 and examined reliability using composite reliability (CR). The procedure to calculate Cronbach's Alpha (CA) and CR are:

Table 6.Average Variance Extracted values of Quality Constructs

Key Quality Dimensions	Average Variance Extracted (AVE)
Business performance (BP)	0.712
Individual Benefits (IB)	0.638
Process Quality (PQ)	0.736

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Organization Support (OS)	0.725
Organizational Benefits (OB)	0.634
Organization Performance (OP)	0.676
System Quality (SQ)	0.670
Social/Intellectual Values (S/I V)	0.513
User satisfaction (US)	0.657

$$\frac{K}{K-1}\frac{\sum_{i=j}^{k} cov(x_i, x_j)}{var(x_0)}$$

Here, K is the number of items, x is the factor loading of item i and vax(xj) the variance of the error of item j.

$$\mathbf{CR} = \frac{\left(\sum_{i=1}^{k} \boldsymbol{\lambda}_i\right)^2}{\left(\sum_{i=1}^{k} \boldsymbol{\lambda}_i\right)^2 + \sum_{i=1}^{k} \boldsymbol{\sigma}_{e_i}^2}$$

Here, K is the number of items of the measurement model,$\boldsymbol{\lambda}_i$ the factor loading item $\boldsymbol{i}$ and $\boldsymbol{\sigma}_{e_i}^2$ the observed variance of the error$\boldsymbol{e}_i$. we examined reliability using composite reliability (CR). As prescribed by [26] scalesshould be above 0.7, and found the model is acceptable. CA and CR values of proposed model inTable 7.

Table 7.Cronbach's Alpha and Composite Reliability Values

Key Quality Dimensions	Cronbach's Alpha	Composite Reliability
Business performance (BP)	0.893	0.826
Individual Benefits (IB)	0.817	0.846
Process Quality (PQ)	0.923	0.940
Organization Support (OS)	0.921	0.937
Organizational Benefits (OB)	0.707	0.715
Organization Performance (OP)	0.743	0.800
System Quality (SQ)	0.821	0.887
Social/Intellectual Values (S/I V)	0.807	0.776
User satisfaction (US)	0.803	0.867

4.1.3 Structural Test (R^2)

It is linear regression text and used to determine how well fits to a data set of observations and, It determines how far an exogenous latent variable affect endogenous latent variables and R^2 is used to evaluate overall predictive strength of the model. According to [22] if R^2> 0.3 Impact is good among Dimensions. Both these values are calculated by PLS structural analysis model using SmartPLS and the R^2 values constructs are presented in **Table 9** using following procedure:

$$\mathbf{R}^2 = 1 - \frac{\mathbf{SS_{res}}}{\mathbf{SS_{tot}}}$$

Where, $\mathbf{SS_{res}} = \sum(\mathbf{y_i} - \mathbf{f_i})^2 = \sum_i \mathbf{e_i^2}$

$\mathbf{SS_{tot}} = \sum_i(\mathbf{y_i} - \bar{\mathbf{y}})^2$, if $\bar{\mathbf{y}}$ is mean of observed data then

$$\bar{\mathbf{y}} = \frac{\mathbf{1}}{\mathbf{n}}\sum_{\mathbf{i=1}}^{\mathbf{n}} \mathbf{y_i}$$

Table 8. R^2 values of Quality Dimensions

Key Quality Dimensions	R Square
Business performance (BP)	0.518
Individual Benefits (IB)	0.746
Process Quality (PQ)	0.843
Organization Support (OS)	0.723
Organizational Benefits (OB)	0.684
Organization Performance (OP)	0.461
System Quality (SQ)	0.612
Social/Intellectual Values (S/I V)	0.766
User satisfaction (US)	0.883

4.1.4 Path

coefficient test

A path coefficient represents the direct effect of a variable assumed to be a cause on another variable. Path coefficients are standardized because they are estimated from correlations. This test is to determine the relationship between latent variables, according to [26] a path coefficient score between -0.1 and 0.1 should be rejected; moreover, Path coefficients are standardized versions of linear regression weights which is used to examine the possible linkage between statistical variables in the structural equation modeling approach. The values of the path coefficient derived hypothesis are listed inTable 9.The procedure to calculate values is

$$r_{12} = P_{21}\frac{\sum z_1 z_2}{N} + \frac{\sum z_1 e_1}{N}$$

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Here, N is the number of items of the measurement model and path coefficient times the variance of z1. The variance of z1 is 1 because it is in standard form. The second term on the right is the correlation between z1 and e2.

Table 9.Path coefficient of our derived hypothesis

Hypothesis	Path	Path Coefficient	Conclusion
H1	OS->SQ	0.55	Accepted
H2	OS->PQ	0.39	Accepted
H3	OS->US	0.25	Accepted
H4	SQ->PQ	0.53	Accepted
H5	SQ->US	0.24	Accepted
H6	SQ->OP	0.54	Accepted
H7	PQ->US	0.23	Accepted
H8	PQ->OP	0.12	Accepted
H9	US->IB	0.56	Accepted
H10	US->OP*	0.00	**Rejected**
H11	IB->I/SV	0.17	Accepted
H12	OP->BP	0.56	Accepted
H13	BP->OB	0.42	Accepted
H14	BP->I/SV	0.24	Accepted
H15	OB->I/SV	0.40	Accepted

*Path coefficient score between -0.10 to 0.10 is rejected.

From above investigation, the Organization support has strong association with system quality since its path coefficient is (β =0.54; P<=0.01), rather than process quality and user satisfaction. But system quality has almost equal of association with process quality (β =0.53; P<=0.05), and organizational performance (β =0.54; P<=0.01). However, process quality has significant association with organization performance (β=0.12; P<=0.05) and user satisfaction (β=0.23; P<=0.05). Similarly, business performance has strong link with organizational benefits (β =0.56; P<= 0.05). At the same time business performance has strong association with organizational benefits (β=0.42; P<=0.05) rather than social/intellectual values (β=0.24; P<=0.01). But organizational benefits as strong link with social/intellectual values (β =0.40; P<=0.01), that means social values and innovation level can be improved by organizational benefits rather than individual benefits and business performance. The relation between constructs illustrated using path coefficient and R^2 values in Figure.2

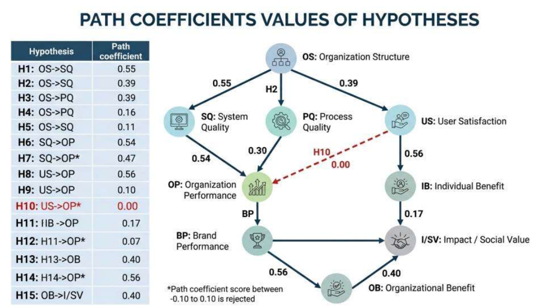

Figure 2 The path coefficients values of hypothesis

5. RESULTS AND FINDINGS

The proposed effectiveness model also called as unified quality model since it consists of significant quality dimensions of UQM namely the organizational support, process quality, product quality, user satisfaction, and Perceived Benefits. The background to Unified quality dimensions is identified based on the literature review of quality models in software, information systems, and knowledge management systems. Apart from quality models, KMS life cycles also helped us to identify significant-quality dimensions. Moreover, the survey study conducted with top-level people of13 companies, which are using KMS for more than 5 years for various organizational reasons. An effectiveness framework has driven 15 hypotheses to evaluate the model and data are collected from various sectors such as nuclear power production, Education, Health, Software Development, and service sectors (BPO). The collected data are statistically evaluated using PLS structural analysis model through SmartPLS and produced the following results.

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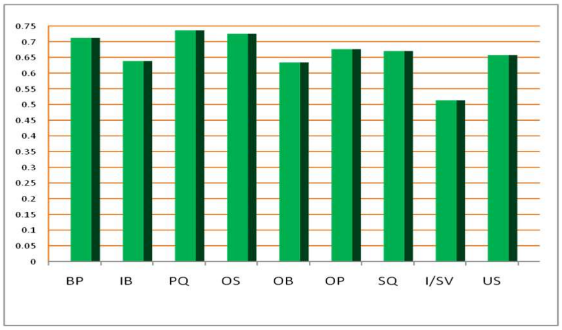

Figure.3.Factors loading correlation between Constructs

The Figure 3 shows that whether a manifest variable has a high correlation with latent variables using Average Variance Extracted (AVE). The above chart shows that process quality (0.736) has a higher correlation with its latent variables' accuracy, uniformity, contemporary and Enrichment of strategies. Next organizational support has 0.725 values for its variables: Culture/reward, affordability/Manageability, Experience, communication, Availability, Willingness, and user readiness. Similarly, business performance (0.712), organization performance (0.76), System quality (0.70), user satisfaction (0.657), individual benefits variables has 0.638 of AVE values. Finally, Social/Intellectual values have scored 0.513 of its variables. According to [24]AVE score should be 0.5 and above to support dimensions and its variables. The AVE values of this research conclude that identified variables for each dimension are more suitable to measure each of the dimensions due to its score.

The Consistency and reliability of data are tested using Cronbach's Alpha(CA) and Composite Reliability(CR).According to [25] cronbach's alpha values must be higher than 0.7 and examined reliability using composite reliability (CR). As prescribed by [26], the scales should be above 0.7. Figute 4 shows quality dimensions consistency and reliability. Process quality (0.923;940), Organizational Support (0.921;0.937), Business performance (0.893;0.826), System quality (0.821;0.887), Individual benefits (0.817;0.846); social/Intellectual values (0.807;0.776), user satisfaction (0.803;0.867) and organization performance (0.743;800). finally organizational benefits are scored CA and CR values as 0.707 and 0.715 respectively. The evaluation considered quality dimensions such as System quality, Process Quality, Management Support, and User satisfaction each as a single construct.

However perceived benefits are divided into five constructs such as individual benefits, organizational performance, Business benefits, Business performance, and social/intellectual values since the effectiveness of KMS majorly associated with its benefits. So perceived benefits cannot consider as single construct it won't give clarity of link between its different benefits. The Figure 5 shows that the strength on proposed model as in following order:

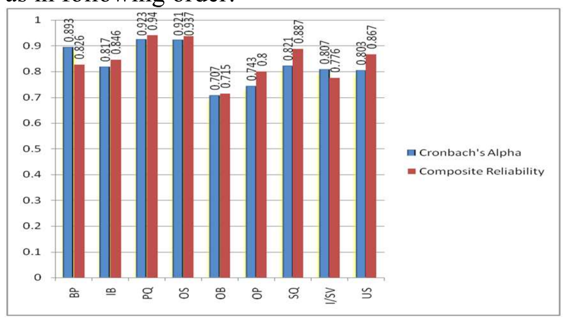

Figure 4 CA and CR value of quality constructs

User satisfaction (0.883),Process quality (0.843),Social/intellectual values (0.766),Individual benefits (0.746),Organizational support (0.723)and organizational benefits (0.684),System quality (0.612) Organizational performance (0.461) respectively

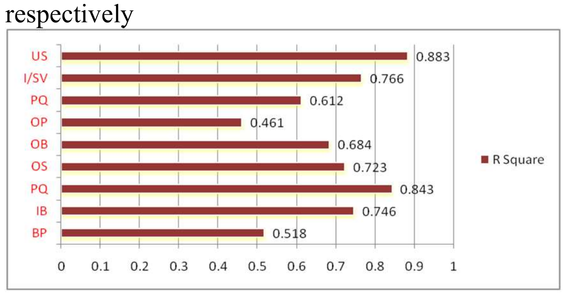

Figure 5 R Squared between Quality Constructs

6.DISCUSSION AND CRITICAL EVALUATION OF EMPIRICAL FINDINGS

6.1 Critique of Findings Against Current Literature

The findings of this study contribute significantly to the KMS literature while also revealing important areas of convergence and divergence with existing research, as discussed below.

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6.1.1 Convergence with Existing Literature

Organizational Support as Foundational Dimension (H1-H3): The strong association between organizational support and system quality (β=0.55) aligns with findings from Kulkarni et al. [10], who established that management commitment and organizational culture are fundamental to KMS quality. The R^2=0.723 for organizational support indicates that this dimension explains 72.3% of the variance in KMS effectiveness, supporting Wong's [28] argument that organizational factors are the "make or break" determinants of KMS success. This convergence validates the emphasis on organizational factors in prior literature while providing stronger empirical evidence through larger sample sizes (n=344) across more diverse sectors than previous studies.

System Quality's Importance (H4-H6): The significant association between system quality and process quality (β=0.53) echoes Owlia's [5] framework, which identified technical attributes as critical success factors. However, our research expands upon Owlia's work by differentiating between Knowledge Worker's Expected Quality and Knowledge User's Expected Quality, providing more granular measurement. The R^2=0.612 for system quality confirms Rao and Osei-Bryson's (2007) assertion that system attributes explain approximately 61% of KMS quality variations, while our study additionally validates this across six sectors rather than the single-sector focus of prior research.

User Satisfaction and Individual Benefits (H9): The strong link between user satisfaction and individual benefits (β=0.56) supports DeLone and McLean's (2003) updated IS success model, which posited user satisfaction as a key precursor to net benefits. Our findings extend this by demonstrating that user satisfaction contributes 74.6% (R^2=0.746) to individual benefits, reinforcing the importance of addressing individual-level user concerns a dimension often overlooked in technology-focused KMS implementations (Seddon, 1997).

6.1.2 Divergence and Novel Contributions

Rejection of H10 (US→OP β=0.00): The most striking finding is the complete rejection of the hypothesized link between user satisfaction and organizational performance. This diverges significantly from DeLone and McLean's [7], [6] IS success model, which has historically treated user satisfaction as a precursor to organizational performance. This finding challenges the fundamental assumption that satisfied users translate to organizational success a finding that may explain why many organizations with highly-rated KMS still fail to achieve strategic objectives.

This divergence can be explained through several lenses:

Measurement Gap: Individual user satisfaction measures immediate, personal benefits (ease of use, content relevance), while organizational performance measures strategic, long-term outcomes (market share, innovation, profitability). The translation from individual to organizational benefits may require mediating factors not captured in the current model.

Cultural Context: Unlike Western studies where user satisfaction often strongly correlates with performance [8], [11], the Indian organizational context may exhibit different dynamics where collective organizational objectives are prioritized over individual satisfaction (Chaudhuri, 2011).

Knowledge Hiding Effect: Recent research by Wang and Yang [14] suggests that satisfied users may still engage in "knowledge hiding" behaviors to protect job securitya phenomenon documented in Asian organizational contexts but less prevalent in Western studies.

Time-Lag Effect: The relationship between user satisfaction and organizational performance may exhibit significant time lags not captured in cross-sectional research design, as suggested by Hasanali [26] and Zheng et al. [27].

Process Quality and Organizational Performance (H8 β=0.12): While significant, the relatively modest association (β=0.12) between process quality and organizational performance is lower than anticipated. This finding suggests that process quality, while important, may be a "hygiene factor" (as per Herzberg's two-factor theory) rather than a performance driver. It aligns with Lee and Choi's [29] observation that KMS processes are necessary but insufficient for organizational impact without complementary innovation capabilities.

Benefits Structure (H11-H15): The finding that organizational benefits (OB) have a stronger influence on social/intellectual values (β=0.40) compared to business performance (BP→I/SV β=0.24) suggests a "value chain" in KMS benefits: business performance → organizational benefits → social/intellectual value. This extends Ahn and Chang's [32] KP3 methodology by empirically demonstrating the sequencing of benefits realization a contribution not previously established in KMS literature.

6.1.3 Comparison with Prior KMS Success Models

Comparison with Jennex-Olfman Model (Jennex,[13]: Jennex's KMS success model emphasizes system quality, knowledge quality, and knowledge worker satisfaction as key components. Our model extends this by incorporating organizational support as an exogenous variable and distinguishing between individual and organizational benefits. Critically, our rejection of H10 challenges Jennex's implicit assumption that user satisfaction leads to organizational success, suggesting the need for mediating or moderating factors in the Jennex-Olfman framework.

Comparison with Kulkarni et al. ([10]): Kulkarni's model identifies organizational support and KM processes as success factors. Our findings support this while providing additional granularity through differentiated constructs for system quality and process quality. The R^2=0.883 for user satisfaction in our model substantially exceeds Kulkarni's reported R^2=0.51, suggesting our expanded dimensional measurement provides superior explanatory power.

Comparison with Owlia[5]: Owlia's KMS quality framework focuses on system quality and service quality. Our model expands this by explicitly addressing organizational support and perceived benefits. The AVE values for our constructs (range 0.513-0.736) exceed Owlia's reported values (range 0.45-0.62), indicating improved construct validity through more comprehensive KQI identification.

6.1.4 Limitations of Current Literature Addressed by This Study

This study addresses several limitations in the existing literature:

Sector Diversity: Previous studies predominantly focused on single sectors[29], [11].Our multi-sector validation provides evidence of framework generalizability, addressing the limitation identified by Jennex[3] regarding sector-specific KMS research.

Sample Size: With n=344, this study exceeds the typical sample sizes in KMS effectiveness research [12] , n=87[14]; Wang & Yang, 2016, n=145), providing more robust statistical power.

Construct Validation: The use of both convergent validity and reliability tests provides more rigorous construct validation than many previous studies, which relied solely on correlation coefficients [34].

Methodological Rigor: PLS-SEM approach with comprehensive testing (AVE, Cronbach's Alpha, Composite Reliability, R^2, Path Coefficients) follows best practices established by Ringle et al. [21] providing more robust findings than previous studies using simpler regression analyses.

6.1.5 Remaining Debates and Controversies

While our study advances KMS effectiveness research, several debates remain unresolved:

Mediating vs. Direct Effects: Our findings suggest that relationships among dimensions may involve mediation effects (e.g., organizational support → system quality → process quality → user satisfaction). Future research should test these mediation pathways, as suggested by Ahmed et al. [31] and Becerra-Fernandez and Sabherwal [33].

Contextual Contingency: While we validated across sectors, the sample may have limitations in its representation of organizational size, KM maturity, and industry dynamics. Future research should examine whether dimensional relationships differ based on these contextual factors.

Causality Direction: The cross-sectional nature of our data limits causal inference. While we theorize directional relationships, longitudinal studies are needed to establish causality, as recommended by Nantapanuwat et al. [25].

Objective vs. Subjective Measures: Our study relies on perceptual measures from knowledge workers. Future research should complement with objective performance data (market share, ROI, innovation metrics) to triangulate findings

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7.CONCLUSION

Technologies and customer expectations are rapidly evolving in this epoch of digital transformation. Organizations must continuously update themselves in technical, functional, organizational image, and values dimensions within increasingly compressed timeframes. Moreover, organizations require high quality and reliability in their processes to satisfy and retain customers in competitive markets. KMS has emerged as the leading solution to address organizational intellectual challenges, serving as a strategic infrastructure for knowledge creation, storage, sharing, and application.

This research addresses the critical challenge of KMS effectiveness a challenge that has historically resulted in failure rates exceeding 70% and economic losses in the billions. The proposed Unified Quality Model (UQM) is developed based on recent expectations of knowledge workers and extensive review of quality and effectiveness models from software engineering, information systems, and knowledge management literature. The framework integrates five key quality dimensions: organizational support, system quality, process quality, user satisfaction, and perceived benefits, measured through 49 validated Key Quality Identifiers (KQIs).

The empirical validation using PLS-SEM with data from 344 knowledge workers across six Indian sectors provides robust support for 14 of 15 hypotheses. Key findings include:

Organizational Support (R^2=0.723) emerges as the most critical foundational dimension, with the strongest influence on system quality (β=0.55)

Process Quality demonstrates the highest explanatory power (R^2=0.843) among quality dimensions, highlighting the importance of functional knowledge processes

User Satisfaction shows the strongest overall explanatory power (R^2=0.883), emphasizing that KMS effectiveness is fundamentally a people-centric endeavor

The rejection of H10 (user satisfaction → organizational performance, β=0.00) challenges traditional IS success assumptions and provides important theoretical implications regarding the individual-organizational benefits gap

Benefits Realization Pathway reveals a hierarchical structure: individual benefits → business performance → organizational benefits → social/intellectual values

7.1 Practical Implications

The findings provide actionable guidance for practitioners:

For KMS Developers and Vendors:

Prioritize system quality dimensions of flexibility, security, effectiveness, and adaptability

Ensure interoperability, accessibility, maintainability, scalability, and completeness

Develop mechanisms for process enrichment and knowledge contemporary

For Organizational Leaders and Managers:

Invest in supportive organizational culture that rewards knowledge sharing

Allocate resources for training, expert participation, and user readiness

Align KMS objectives with strategic business goals

For Knowledge Workers and End Users:

Recognize user satisfaction as the critical mediator between technical quality and individual benefits

Engage in continuous feedback for system improvement

Actively participate in knowledge enrichment and sharing processes

7.2 Limitations and Future Research Questions

While this study makes significant contributions, it raises important questions that warrant future investigation:

Q1: Temporal Dynamics: How do the relationships among effectiveness dimensions evolve over time? Are there critical timing considerations in KMS implementation (e.g., organizational support must precede system quality, or can they be developed concurrently)? Longitudinal studies tracking KMS effectiveness across implementation stages (initiation, implementation, stabilization, maturity) are needed.

Q2: Contextual Boundaries: Do the dimensional relationships differ across organizational contexts (size, sector, KM maturity, national culture)? Our

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Indian multi-sector validation provides initial evidence of generalizability, but further cross-cultural studies are needed to establish contextual contingencies.

Q3:Disconfirmed Hypothesis Investigation: Why does user satisfaction not translate directly to organizational performance (H10 rejected)? Is this a measurement artifact, a theoretical misspecification, or a genuine phenomenon requiring explanation? What mediating or moderating variables (e.g., organizational citizenship behavior, knowledge hoarding, innovation capability) explain this disconnect?

Q4:Integration with Development Lifecycle: How can the UQM be integrated into the software development lifecycle for KMS? Specifically, how should the identified quality dimensions inform requirements engineering, architecture design, and testing processes for KMS?

Q5:Artificial Intelligence and Emerging Technologies: How will AI-powered knowledge management (machine learning, natural language processing, semantic reasoning) transform KMS effectiveness dimensions? Do traditional quality frameworks remain applicable, or do AI systems require fundamentally different quality metrics?

Q6:Objective Validation: Can the perceptual measures used in this study be validated against objective performance indicators (financial metrics, innovation rates, employee turnover reduction, time-to-market improvements)? Triangulation with objective measures would strengthen the practical relevance of findings.

Q7:Intervention Studies: What specific interventions (training programs, cultural change initiatives, technological upgrades) most effectively improve each dimension? Action research approaches could translate correlational findings into prescriptive interventions.

Q8: Maturity Models: Can the UQM be extended to create a KMS effectiveness maturity model that provides organizations with staged progression pathways for capability development?

Q9: Sector-Specific Optimization: While this study validates the UQM across sectors, sector-specific optimization may be necessary. For instance, healthcare KMS may require emphasis on clinical decision support, while software development KMS may prioritize defect prevention and coding standards. What sector-specific quality dimensions and KQIs are needed?

Q10: Stakeholder Heterogeneity: Do different stakeholder groups (knowledge workers, managers, executives, IT administrators, external partners) perceive KMS effectiveness differently, and should effectiveness frameworks account for these different perspectives?

7.3 Application in Software Requirements Engineering

A particularly promising avenue for future research is the application of the UQM in software requirements engineering (RE) processes. The requirements phase is vital in software development, determining technology selection, process modeling, architecture, and testing. KMS can support early-stage software development by providing historical knowledge of technologies and their limitations, enabling requirement analysts to identify potential design constraints and avoid repeated mistakes.

However, two critical questions remain:
What UQM architecture optimally supports the RE process? The relationship between KMS quality dimensions and RE effectiveness requires investigation.
What UQM life cycle best facilitates requirements knowledge management? The interplay between knowledge capture, storage, sharing, and application in the RE context needs elucidation.
The UQM provides a foundation for this research, offering validated dimensions and KQIs that can inform the design of KMS specifically for software engineering contexts.

This research contributes to the ongoing scholarly conversation on KMS effectiveness by providing a comprehensive, empirically-validated framework that bridges theoretical gaps and offers practical guidance. The rejection of the user satisfaction-organizational performance link challenges established IS success paradigms and opens new research directions. As organizations continue to invest in KMS as strategic assets, the UQM offers a robust foundation for systematic effectiveness assessment and improvement.

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The road ahead requires collaborative, interdisciplinary efforts spanning computer science, organizational behavior, cognitive science, and strategic management. By addressing the ten research questions identified above, the research community can continue advancing KMS effectiveness, ultimately enabling organizations to fully leverage their intellectual assets for sustainable competitive advantage in the knowledge economy.

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