Knowledge Management Process in Pharmaceutical Companies: Role of Innovation on Organizational Performance

Priyavarsha R[1] and Dr. Sudha S[2]

[1] & 2 School of Management Studies, VISTAS, Chennai
rpriyavarsha@gmail.com

Abstract: In the dynamic landscape of the pharmaceutical industry, knowledge management plays a pivotal role in shaping the organizational performance of companies. This paper explores the multifaceted relationship between knowledge management processes and innovation, highlighting their profound influence on the overall performance of pharmaceutical organizations. It delves into the intricate mechanisms through which knowledge is acquired, shared, and leveraged within these companies, fostering innovation, and ultimately driving enhanced performance. The research highlights how innovation is sparked by knowledge management, serving as a bridge between the wealth of information available in the industry and its transformation into novel drugs, therapies, and business strategies of selected pharma companies through knowledge management and innovation. This research study investigates the dynamic interplay between knowledge acquisition, dissemination, application, innovation, and organizational performance within selected pharmaceutical companies. In the context of the ever-evolving pharmaceutical industry, where scientific breakthroughs and novel therapies are paramount, the role of knowledge in encouraging innovation and, consequently, influencing organizational performance is of particular interest.

Keywords: Knowledge Management, Innovation, Pharmaceutical companies, Organization performance

1 Introduction

The pharmaceutical industry stands as a bastion of innovation and scientific advancement, continually striving to develop new therapies and drugs that can alleviate human suffering and enhance the quality of life. In this dynamic and highly regulated sector, the management of knowledge is not just an imperative but a strategic necessity. Knowledge management processes, which encompass the collection, organization, dissemination, and utilization of information and expertise, contribute a pivotal role in shaping the organizational performance of pharmaceutical companies.

In this era of rapid technological advancement and evolving healthcare needs, knowledge has become a critical currency. The ability to harness, share, and leverage knowledge effectively can determine a pharmaceutical company's success or failure. This is particularly evident in the context of innovation, where the development of

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groundbreaking therapies, drug discoveries, and novel business strategies are contingent on a deep and adaptable reservoir of knowledge.

The aim of this paper is to delve into the intricate and symbiotic relationship between knowledge management processes and innovation within pharmaceutical companies and to explore the consequential impact on organizational performance. By investigating how knowledge is acquired, stored, and disseminated within these organizations, we can understand how it serves as a driving force behind innovation. In turn, this innovation fuels enhanced performance, fostering a competitive edge, and contributing to the industry's ability to adapt to the ever-evolving landscape of healthcare and pharmaceuticals.

Pharmaceutical companies are confronted with an array of challenges, from rigorous regulatory requirements and complex drug development processes to emerging health crises and rapidly changing market dynamics. Effective knowledge management processes enable these organizations to navigate these challenges more adeptly, facilitating the development of life-saving therapies and the rapid response to global health crises. Thus, the role of knowledge management extends far beyond mere data storage; it is a catalyst for innovation, a bridge between the wealth of information available in the industry and its transformation into tangible advancements.

As we delve into the nuanced interplay between knowledge management, innovation, and organizational performance in pharmaceutical companies, it becomes evident that embracing knowledge-centric practices is essential for staying ahead in this competitive and high-stakes industry. This paper aims to shed light on the critical importance of knowledge management as an enabler of innovation and, by extension, improved organizational performance in the pharmaceutical sector. It offers insights for industry leaders, policymakers, and researchers on how to cultivate a knowledge-driven culture, invest in the right technologies, and foster cross-functional collaboration to harness the full potential of knowledge management. In doing so, pharmaceutical organizations can unlock new horizons of innovation, ensuring the industry's continued growth and its crucial role in advancing global healthcare.

2 Research objective

1. To identify various knowledge management factors that influence innovation in an organization.
2. To evaluate the impact of innovation on the organizational performance of select pharma companies.

3 Literature review:

Knowledge management and innovation difficulties can be traced back to the resource-oriented approach, a widely used theoretical framework for explaining business results [3]. The ideas behind the knowledge-based perspective were often applied to this viewpoint. [24] argues that businesses can gain an edge and achieve better performance by making smart use of strategic resources that are essential for doing so and for assuring

good financial results. He states that the term "resources" encompasses both "hard" and "soft" assets that are integral to the operation of a business. Moreover, some works based on the knowledge-based view of the firm have advanced the idea that a company's true competitive advantage depends on its access to information, generation of knowledge, and improvement of its capacity for innovation. [10] found that the processes of knowledge absorption and knowledge generation are critical to the success of innovation and business performance. According to [19], a company's ability to innovate and, by extension, its overall performance can benefit from the use of knowledge management practices. Process innovation was the primary focus of the research conducted by [7]. On the other hand, many researchers have found a positive and substantial link between product innovation and business success [4, 6]. The application of marketing innovations is linked by many academics to improved business performance, which in turn boosts profits and a company's competitive edge [14, 20].

[24] argued that innovation is not limited to physical objects but can take the form of anything that is unique in the eyes of the beholder. In addition, the term "innovation" is often used to indicate revolutionary shifts that are seen as novel and exciting by the experienced group. Micro, small, and medium-sized companies (MSMEs) are affected by a wide range of factors. Research by [14, 16], among others, has proven that product innovation has a substantial effect on business outcomes. The impact of an entrepreneur's mindset on the success of a small or medium-sized business has been studied before [18]. Knowledge management [22] and organizational learning have also been studied for their potential effects on productivity.

Knowledge management (KM) practices refer to the systematic procedures involved in the acquisition, storage, comprehension, dissemination, and application of information within an organizational context. These activities are undertaken as part of the organizational learning process, taking into consideration the cultural and strategic aspects of the organization [17]. As per the insights of [4], knowledge management (KM) encompasses the systematic pursuit of discerning the implicit and explicit knowledge held by individuals, groups, and entities. The objective is to convert this invaluable resource into organizational assets, empowering individuals and managerial personnel to adeptly leverage it across various decision-making scenarios. Knowledge Management (KM) is a comprehensive and structured approach to managing knowledge inside an organization. It encompasses the processes of developing, transferring, transmitting, storing, and implementing knowledge in order to enhance the efficiency and effectiveness of the organization's workforce [5]. The knowledge-based theory is a pertinent theoretical framework that greatly contributes to the understanding of the crucial role played by knowledge management. According to [25], this theory posits that the effective management of knowledge, encompassing activities such as knowledge acquisition, storage, creation, sharing, and implementation, is crucial for attaining heightened levels of productivity, financial and human resource performance, and ultimately enhancing sustainable competitive advantage.

As previously mentioned in the research backdrop, diverse models are employed to depict knowledge management practices in various manners. This study incorporates five primary practices derived from the models proposed by [20]. Nonaka [20] and [4] are the sources referenced in this text. The aforementioned practices encompass various

aspects of knowledge management, including the development, acquisition, sharing, storage, and implementation of knowledge. These practices have been commonly utilized in the evaluation of knowledge management practices. Knowledge creation is the process through which organizations use both internal and external resources to develop novel knowledge that aligns with their organizational objectives. Strategies employed by successful small and medium-sized enterprises (SMEs) include brainstorming techniques and doing research to effectively leverage the knowledge assets of consumers, suppliers, and staff members [18]. The concept of knowledge acquisition refers to the systematic process of obtaining and assimilating important knowledge from a range of sources, including both internal and external resources. These resources may include personal experiences, expert opinions, pertinent papers, and strategic plans, among others. Interviewing, laddering, process mapping, concept mapping, watching, educating, and training are often utilized strategies for the acquisition of information. The act of disseminating information and exchanging knowledge among individuals or groups. Knowledge sharing is a fundamental mechanism that facilitates the interchange of both individual and collective knowledge within personal and organizational contexts. Knowledge sharing can be defined as the act of transferring knowledge from one individual to another, from individuals to groups, or from one organization to another organization [7]. The concept of knowledge storage encompasses the process of effectively recording and retaining individual and organizational knowledge, through either soft or hard methods, with the aim of facilitating easy retrieval. The process of knowledge storage involves the utilization of technological systems, including contemporary informational hardware and software, as well as human procedures, to effectively identify and capture the knowledge present inside an organization. The study by [16] aimed to examine the impact of knowledge management practices on organizational performance through empirical investigation. In other terms, the process of organizing and retrieving organizational knowledge entails the storage of knowledge in a manner that facilitates the retrieval and utilization of information by individuals. Knowledge implementation refers to the practical use and application of acquired knowledge in order to make informed decisions, enhance performance, and accomplish desired objectives. The integration of organizational knowledge should be applied to the services, processes, and products offered by the organization. The concept of organizational performance holds significant importance in the field of management research and is widely regarded as a crucial factor for evaluating the success of small and medium-sized enterprises (SMEs). The enhancement of performance is a crucial aspect of small and medium-sized enterprise (SME) management that has garnered significant attention from both management scholars and practitioners. The approach that has been extensively explored for increasing performance is the use of strategic variables, such as knowledge management (KM) practices.

4 Hypothesis

H_1: Acquisition of knowledge significantly influences innovation in an organization.
H_2: Dissemination of knowledge significantly influences innovation in an organization.

H_3: The application of knowledge significantly influences innovation in an organization.
H_4: Innovation significantly influences the organizational performance of select pharma companies.

5 Research Methodology

The research is quantitative and descriptive in nature. The measures for the independent and dependent variables were selected based on an exhaustive literature review of the present research. There were two sections to the questionnaire. Table 1 displays the sample's demographics, while the remainder of the data consists of respondents' replies to the survey questions on a five-point Likert scale, where 1 indicates strong disagreement and 5 indicates strong agreement. A total of 340 employees from various pharmaceutical businesses were surveyed about knowledge management, innovation, and performance using a simple random sampling procedure.
The researchers in this study used both descriptive and inferential statistics to get the job done. Mean, standard deviation, percentage, and frequency were used to compile the descriptive statistics. The study primarily utilizes Statistical Package for the Social Sciences (SPSS) and AMOS version 26 as its primary analytical tools. The use of EFA is also beneficial in assessing the construct validity during the first stages of instrument development. The investigation concluded by doing Structural Equation Modelling (SEM), a multivariate technique that enables the estimation of relationships between all variables in the study by simultaneously analyzing multiple regression equations.

6 Results and Discussion

Table 1. Demographic Profile of the Respondents

Measures	Items	Percentage
Gender	Female	73
	Male	27
Age (Years)	Less than 20	4
	21-25	26
	26-35	42
	36-45	19

	46-65	9
Education	Bachelor's Degree	47
	Any other	23
	Master's Degree	20
Experience	Less than 5 years	18
	6-10 years	45
	Above 10 years	37

Source: Primary data

The provided data illustrates the distribution of several demographic and background factors among a surveyed population. In terms of gender, 73% of the respondents identified as female, while 27% identified as male. The age distribution shows that the majority falls within the 26-35 years range, accounting for 42%, with 21-25 years and 36-45 years following at 26% and 19%, respectively. Those above 45 years are less represented, with only 9%. When it comes to educational background, nearly 50% of those who participated hold a bachelor's degree (47%), 20% have a master's degree, and 23% have some other type of education. In terms of professional experience, 45% have 6-10 years of experience, followed by 37% with over 10 years, and 18% with less than 5 years.

7 Exploratory Factor Analysis

Exploratory factor analysis (EFA) was committed to extract the knowledge management process dimensions. EFA was performed using Principal component analysis with Promax rotation. The Kaiser-Meyer-Olkin (KMO) value of 0.902 was found to be suitably higher than the recommended threshold of 0.60. This finding provides confirmation that the sample size is adequate for doing factor analysis. In addition, the Bartlett test of sphericity provides further evidence for the sufficiency of the data, as it yielded a significant result at a significance level of 1%. From 16 items, 5 factors were extracted which fulfill the criteria of Eigenvalue above 1. These five factors are able to explain the total variance of 80.17%.

Before performing hypothesis testing the research tested the predictor variables' multicollinearity. If two or more independent variables have correlation coefficients above

0.8 and variance inflation factor (VIF) values above 3.3, there exists a case of high collinearity among variables. As indicated in Table 2, correlations are below 0.8 and VIF within the threshold limit confirmed no multicollinearity (Kock, 2015).

8 Reliability and Validity

The reliability of the data ensures that measurements are consistent and dependable. In the current study, data reliability is determined by Cronbach's alpha and Composite Reliability (CR). Tables 2 and 3 exhibit that alpha values and CR values are above the threshold of 0.7. Therefore, confirming the internal consistency of data.

Convergent validity determines the degree to which different measures or indicators of the same construct are related to one another. The average variance extracted (AVE) values above 0.5 for all five research constructs fulfill this validity condition. Further, the discriminant validity indicates different constructs are indeed distinct and not related to each other. When the Maximum Shared Variance (MSV) is less than AVE, discriminant validity is met. Table 3 confirmed that MSV is less than AVE. All these results strengthen the credibility and validity of the data (Fornell and Larcker, 1981).

Table 2. Factor loadings and descriptives

Factor	Items	Loadings	VIF	Cronbach's Alpha
Acquisition	Q1	.909	2.386	0.845
	Q2	.848		
	Q3	.838		
Dissemination	Q4	.892	2.634	0.909
	Q5	.904		
	Q6	.761		
	Q7	.921		
Application	Q8	.868	1.801	0.875
	Q9	.848		
	Q10	.895		
Innovation	Q11	.894	2.405	0.915
	Q12	.845		
	Q13	.905		
Organization Performance	Q14	.878	-	0.856
	Q15	.870		
	Q16	.884		

Source: Primary data

The provided table outlines the results of a factor analysis for a set of survey items, indicating the loadings, variance inflation factor (VIF), and Cronbach's alpha for each factor. The "Acquisition" factor demonstrates strong loadings for its associated items (Q1, Q2, Q3), with values ranging from 0.838 to 0.909, signifying a robust association with the underlying construct. However, it's important to note that there is some level of multicollinearity present within this factor, as indicated by VIF values above 1. This suggests that these items may have shared variance. On the positive side, Cronbach's alpha value of 0.845 indicates reasonable internal consistency reliability for this factor. The "Dissemination" factor exhibits even higher loadings for its items (Q4, Q5, Q6, Q7), with values ranging from 0.761 to 0.921, underscoring a strong connection to the intended construct. Moreover, the VIF values indicate a high degree of multicollinearity among these items, potentially implying that they are measuring very similar aspects. However, the factor's Cronbach's alpha value is excellent at 0.909, demonstrating strong internal consistency.
The "Application" factor demonstrates good loadings for its items (Q8, Q9, Q10), with values ranging from 0.848 to 0.895, suggesting a solid alignment with the underlying factor. The VIF values are within an acceptable range. Furthermore, the Cronbach's alpha value of 0.875 indicates good internal consistency for this factor.
The "Innovation" factor presents strong loadings for its items (Q11, Q12, Q13), with values ranging from 0.845 to 0.905, affirming a significant association with the construct. VIF values above 1 indicate some multicollinearity among these items, but the factor's Cronbach's alpha of 0.915 showcases high internal consistency.

The "Organization Performance" factor is characterized by solid loadings for its items (Q14, Q15, Q16), ranging from 0.870 to 0.884, which suggests a substantial connection with the factor. Notably, there is no VIF value provided, but Cronbach's alpha of 0.856 indicates good internal consistency.
This factor analysis reveals the strength of the correlations with regard to survey questions and the corresponding foundational constructs, emphasizing the need to consider and address multicollinearity when interpreting the results. The satisfactory Cronbach's alpha values for most factors reinforce the reliability of the measurements within each construct.

Table 3. VIF, reliability, validity, and correlations

Construct	**CR**	**AVE**	**MSV**	**Correlations**				
				1.	**2.**	**3.**	**4.**	**5.**
1. Acquisition	0.847	0.648	0.305	1	.536**	.479**	.552**	.422**
2. Dissemination	0.910	0.716	0.438		1	.662**	.633**	.470**
3. Application	0.876	0.702	0.438			1	.606**	.405**

4. Innovation	0.917	0.787	0.401				1	.509**
5. Organizational performance	0.857	0.666	0.259					1

**: Correlation significant at 0.01 level

9 Hypothesis testing using Structure equation modeling (SEM)

Structural Equation Modelling is a statistical technique employed to investigate and analyze complex interrelationships among variables within a theoretical framework. The current study utilized Maximum Likelihood Estimation for SEM, citing its robustness, capacity to accommodate various data distributions, and established theoretical foundation [3].

The verification of research hypotheses relies on the statistically significant values and critical ratio (t-value) associated with particular paths. The approval of the study hypothesis is associated with a specific pathway when both the p-value is less than 0.05 and the t-value exceeds 1.96.

Based on the outcomes of path analysis and hypothesis testing, as outlined in Table 4 and depicted in Figure 1, it was verified that all three dimensions of knowledge management exert an influence on innovation in pharma companies. The standardized path coefficient (β) denotes the intensity of the influence of the independent variable over the dependent one.

The results confirmed that the acquisition of knowledge management significantly influences the innovation capability of the firm as the β is 0.255 with p=0.000 & T= 4.291. Since the p-value <0.05, hence hypothesis H1 was accepted. The impact of dissemination on innovation is highest and significant as $\beta = 0.321$ and $p<0.05$, confirming hypothesis H2. Similarly, innovation in an organization is positively influenced by the application process of knowledge management and this impact is statistically significant since, β= 0.278 with p= ($p<0.05$). Thus, H3 is supported.

Finally, the results also confirmed the importance of innovation in enhancing the performance of pharma companies. The β value (0.527) for the path of innovation influence on organization performance is positive and significant as p is less than 0.05, supporting H4.

The coefficient of determination for innovation revealed a high impact on the knowledge management process. The R^2 is 0.52 (52% variation). In the case of organization performance, innovation explains 28% of variations.

The model's fit indices include a Chi-square/degree of freedom (CMIN/df) value of 1.923, which meets the criterion (≤3). The Adjusted Goodness of Fit Index (AGFI) is 0.914, surpassing the requirement (≥0.80). Additionally, the Comparative Fit Index (CFI) stands at 0.975, exceeding the benchmark (≥0.90), and the Normalized Fit Index (NFI) is 0.950, also surpassing the threshold (≥0.90). These values all meet the specified criteria. The Root Mean Square Error of Approximation (RMSEA) value of 0.052 is also observed to be lower than the threshold of 0.08, as specified by Hair et al. (2010).

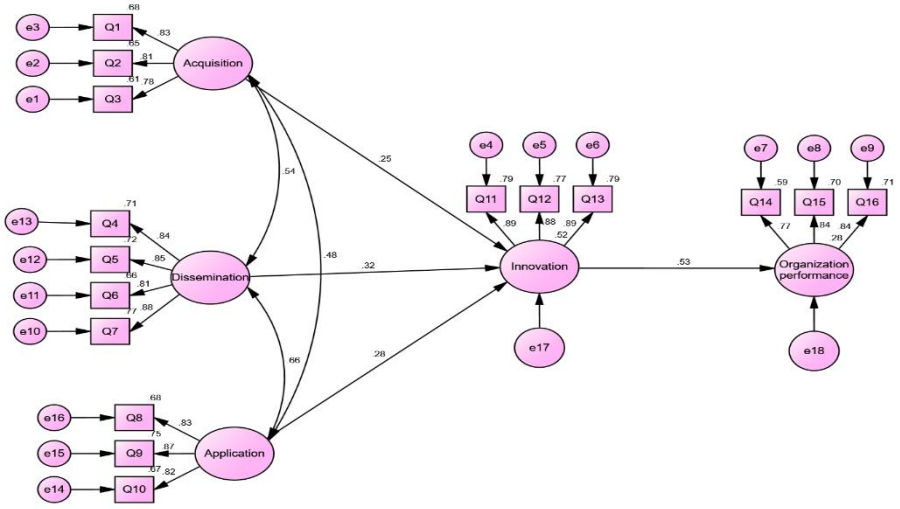

Fig. 1. Casual structure model

Table 4. Path coefficients and hypothesis results

Hypothesis	Path	S.E.	C.R./T	P	Path coefficient (β)	Decision
H1	Acquisition→ Innovation	.054	4.291	0.000	0.255	Supported
H2	Dissemination → Innovation	.075	4.645	0.000	0.321	Supported
H3	Application → Innovation	.063	4.130	0.000	0.278	Supported
H4	Innovation → Organization performance	.060	8.703	0.000	0.527	Supported

Source: Primary survey

10 Discussion and Implications

This study delves into the intricate relationship between knowledge management processes - specifically acquisition, dissemination, and application - and their impact on innovation in pharmaceutical companies. Furthermore, it explores how innovation, in

turn, influences organizational performance. The findings from this research provide valuable insights into the connections between these critical components.

The findings suggest a substantial favourable link between the acquisition of knowledge management and the innovation capability of pharmaceutical firms. This result is in line with recent research emphasizing the critical role of knowledge acquisition in driving innovation [12]. Successful knowledge acquisition ensures that companies have the foundation needed to innovate effectively. Based on this result it is suggested to pharma companies' managers that they should actively identify, capture, and organize both internal and external knowledge resources for achieving high innovation.

The highest and most significant impact on innovation within pharmaceutical companies is attributed to the dissemination process of knowledge management. This finding is in accordance with previous research which underscores the significance of efficient knowledge dissemination mechanisms in fostering innovation and competitive advantage [11]. To foster innovation, organizations should focus on enhancing knowledge sharing and collaboration among employees. Implementing efficient dissemination mechanisms, such as knowledge-sharing platforms or regular cross-functional meetings, can facilitate the exchange of valuable insights and ideas, nurturing a culture of innovation.

The results also proved that Innovation within the organization is positively influenced by the application process of knowledge management. When organizations effectively apply their knowledge resources, they harness the full potential of their intellectual capital, leading to the generation of novel ideas, products, or processes [22]. Pharmaceutical firms should encourage employees to apply knowledge effectively by providing the necessary tools and platforms for innovation.

The study also confirms the significant function of innovation in enhancing the efficiency of pharmaceutical companies. Recent literature has emphasized that innovation is fueled by organizational growth, particularly within knowledge-intensive industries like pharmaceuticals [21] Given the strong link between innovation and organizational performance, pharmaceutical companies should proactively promote an innovation-centric culture. This includes rewarding innovative thinking, investing in training and development programs focused on innovation, and providing resources for research and development activities. Cultivating an environment that encourages and rewards innovation can yield long-term benefits in terms of improved organizational performance.

The finding that knowledge acquisition significantly influences innovation underscores the importance of a strategic approach to knowledge management within pharmaceutical organizations. Companies should prioritize the development of mechanisms for continuous learning, knowledge capture, and expertise identification to fuel their innovation efforts.

The implication that dissemination of knowledge significantly influences innovation emphasizes the need for efficient communication and collaboration platforms. Organizations should invest in tools and strategies that facilitate the sharing of information and expertise across teams, departments, and even external partners.

The result that knowledge application significantly influences innovation highlights the necessity for a culture of applying knowledge to practical problem-solving. Organizations should encourage employees to use the knowledge they acquire in innovative ways and create an environment that supports experimentation and risk-taking.
The revelation that innovation significantly influences organizational performance reinforces the notion that pharmaceutical companies need to prioritize and foster a culture of innovation. This involves investing in research and development, fostering cross-functional collaboration, and incentivizing novel approaches to drug development and healthcare solutions.

11 Conclusion

This research study has provided valuable insights into the intricate relationships between knowledge acquisition, dissemination, application, innovation, and organizational performance within select pharmaceutical companies. The four hypotheses tested in this study have shed light on critical factors that shape the success and competitiveness of pharmaceutical organizations.
The empirical evidence supports the contention that knowledge is not just an organizational asset but a driving force behind innovation. The acquisition, dissemination, and knowledge application are integral to the innovative operations within these companies. The positive influence of innovation on organizational performance underscores the critical role it plays in ensuring the continued success of pharmaceutical companies. As pharmaceutical organizations strive to navigate a complex and ever-changing landscape, the findings of this study offer actionable guidance. By investing in robust knowledge management processes, fostering a culture of innovation, and integrating innovative practices into their core operations, these companies can position themselves for sustained success in research, drug development, and healthcare solutions. The interplay of knowledge and innovation is pivotal, not only for these companies but also for the advancement of healthcare on a global scale.

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