

## Knowledge management strategy and innovation performance of manufacturing firms of Uganda

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### ABSTRACT

To thrive, many businesses, especially those based in developing countries, rely heavily on their ability to innovate. However, improving on the innovation performance is challenging for many manufacturing firms. This study therefore investigated the effect of knowledge management strategy on innovation performance. The study was guided by resource-based view theory. A cross-sectional explanatory survey design was applied to examine the nature of reality. Data was collected from a sample of 263, picked from a total of 3894 manufacturing firms by use of simple random sampling and purposive sampling techniques. Further, a self-administered questionnaire was the only tool used for data collection. The collected data were analysed and hypotheses tested using hierarchical and multiple regression models. The findings shed light on several crucial aspects of knowledge management strategy that influence innovation performance. Specifically, codification strategy and personalisation strategy were found to have a substantial impact on innovation performance, particularly in the context of the manufacturing sector. The study only covered knowledge management strategy among manufacturing firms, even though it is also popular in organisations, especially the service sector organisations. Thus, the findings are not generalisable to all other firms. Further, the study employed a cross-sectional quantitative research design, yet innovation performance fluctuates over time and depends on the environment that one is facing at that particular time. Finally, the study was limited to only one predictor of innovation performance: knowledge management strategy despite the existence of several other predictors. Results suggest that effective knowledge management strategies implemented at the firm level are likely to improve the level of innovativeness of manufacturing firms. Given the positive and significant influence of both knowledge codification and knowledge personalisation strategies on innovation performance, it is recommended that manufacturing firms adopt a balanced knowledge management approach that integrates both strategies. Specifically, firms should invest in robust knowledge codification systems—such as databases, standard operating procedures, and digital knowledge repositories—to ensure that critical organisational knowledge is captured, stored, and easily accessible for reuse and continuous improvement. At the same time, organisations should actively promote knowledge personalisation through initiatives that facilitate direct interaction among employees, including teamwork, mentorship programs, communities of practice, and cross-functional collaboration. This will enhance the sharing of tacit knowledge, which is essential for creativity and the development of novel solutions. Furthermore, management should align knowledge management strategies with organisational innovation goals by fostering a supportive culture, investing in enabling technologies, and providing continuous training to employees. This dual emphasis will enable firms to leverage both explicit and tacit knowledge effectively, thereby sustaining and enhancing innovation performance.

**Keywords:** Codification Knowledge Strategy, Innovation Performance, Manufacturing Firms, Personalisation Knowledge Strategy

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### I. INTRODUCTION

The manufacturing sector plays a central role in Uganda's economic transformation, contributing to industrialization, job creation, and value addition. Moreover, due to easy access to the global market, Africa's manufacturing industry has consistently been one of the continent's most cutting-edge economic sectors. (Jahanbakht & Mostafa, 2022) said that this sector is widely acknowledged for the substantial benefits it provides to national economies via increased gross domestic product (GDP) which is the total monetary value of all final goods and services produced within a country's borders over a specific period of time (usually a year or a quarter), employment, and tax income. However, the sector continues to face persistent challenges such as low productivity, limited technological adoption, high employee turnover, and inadequate knowledge retention systems. To remain competitive in an increasingly dynamic global environment, manufacturing firms must leverage knowledge as a strategic resource to enhance their innovation capabilities. This is consistent with the Knowledge-Based View (KBV) of the firm, which argues that knowledge is the most critical asset for achieving sustainable competitive advantage. Businesses in today's cutthroat marketplace often prioritize innovation as a way to stand out from the crowd, wow customers, and boost profits. Profit,

market share, and market growth rate are some of the classic monetary metrics used to assess an innovation's performance (eg (Bican & Brom, 2020); (Wendra et al., 2019)). Moreover, the value of an organization's innovation performance in allowing it to meet the needs of its consumers and the market has been the subject of much discussion (Harsono et al., 2024). Additionally, in economies driven by intangibles, the management of knowledge has grown essential and is now a daily priority for managers and company leaders. Research has recognized the significance of knowledge management strategy as a precursor to innovation (Cristache et al., 2025a). Despite its extensive acknowledgment, there exists a scarcity of empirical data on the correlation between knowledge management strategy and the innovation performance of businesses (Mardani et al., 2018).

Moreover, the little empirical literature depends on several definitions and metrics to define KM strategies and innovation performance similarly. This variability produces different outcomes. Knowledge management strategies (KMS) provide structured approaches through which firms create, share, and apply knowledge to improve performance outcomes. Among the most widely recognized strategies are codification and personalization (Cristache et al., 2025b). This gap underscores the need for systematic investigation to provide insights that can inform both theory and managerial practice. This research aims to empirically investigate the impact of the two categories of knowledge management strategies (codification and personalization) on the innovation performance of manufacturing enterprises in Uganda, hence addressing this gap. The specific research objectives are; to determine the effect of codification Knowledge strategy on innovation performance, and to evaluate the effect of personalization knowledge strategy on innovation performance among manufacturing firms in Uganda.

### 1.1 Research Objective

- (i) To establish the effects of Codification Knowledge strategy on innovation performance
- (ii) To determine the effects of personalization knowledge strategy on innovation performance

## II. LITERATURE REVIEW

### 2.1 Theoretical Review

#### 2.1.1 Resource Based View

The RBV hypothesis proposes that companies may gain a strategic edge by cultivating resources that are both unique and widely dispersed (Barney et al., 2011). Resources that are valuable, scarce, imperfectly imitable, and imperfectly substitutable (VRIN) are the basis of innovation performance (Barney et al., 2011). The RBV relies on the idea that firm-to-firm differences in resource availability are stable across time. In equilibrium, this allows for enormous profits for businesses, albeit this has been shown to remain mostly unchanging across time (Barney et al., 2011). According to the Resource-Based View (RBV) theory, a company's innovation performance is based on the longevity, openness, transferability, and replaceable nature of its resources and skills. The idea posits that businesses have different levels of access to various resources and competencies. Tacit knowledge and goodwill are two examples of resources that are difficult to exchange (Teece, 2007). Hence, from an RBV point of view, businesses not only have access to a wide variety of resources but also to persistent collections of those resources. Due to their inertia and non-tradability in the factor markets, resource heterogeneity emerges as a consequence. Companies' bottom lines improve as they implement better procedures and structures, either by drastically reducing expenses or improving product quality. Instead of maximizing monetary gain via strategic product placement, this method seeks to maximize rents flowing to the business due to its scarcity of firm-specific resources. Upstream of product markets is where a company's ability to innovate shines, supported by its unique and hard-to-replicate assets. To fully capitalize on possibilities, businesses must also have a strong grasp on the resources at their disposal (Ghobadian et al., 2008).

The capacity to identify or build unique talents is crucial to the growth and survival of any business (Hongal & Kinange, 2020). Physical objects, digital data, and human capital are the three main types of resources. Financial and material assets like real estate, machinery, and raw material stockpiles are examples of tangible resources. Construction, technology, and operating procedures are all examples of intangible assets. Culture, management, skills, and talent of employees are all examples of human resources. When separated from other resources, these are useless. Hence, the ability of enterprises to gather, integrate, and manage these resources is valued by the resource-based theory (Sharma & Correa, 2003). But, whether or not they are successful relies on their ability to logically recognize and make use of scarce and unique resources (Barney et al., 2011). Strong complementarity and co-specialization linkages exist between resources (Mathews, 2002). Understanding competitive advantage (Bridoux, 2004) and businesses' innovative performance requires an appreciation of how resources are grouped and interact with one another and how they fit into the system. Yet, the RBV theory does not explain how to develop new valuable resources in the future or how to renew, re-integrate, or reconfigure existing resources in the face of volatile markets (Ambrosini & Bowman, 2009). Thus, the researcher has reached the bridge of organisational learning theory.

## 2.2 Empirical Review

### 2.2.1 Knowledge Management Strategies and Innovation Performance

Knowledge Management primarily seeks to cultivate a knowledge-centric culture and provide a framework for assessing and assimilating new experiences and information (Mardani et al., 2018). Knowledge management may facilitate the generation of new knowledge via investigation while simultaneously promoting the use of existing knowledge, hence enhancing the expression of current knowledge inside organizations. Knowledge codification and knowledge personalization are two prevalent knowledge management methodologies that facilitate the attainment of complementary objectives (Bunawan & Ahmad Sham, 2024a). Currently, there is no agreement in either theoretical or empirical literature about the appropriate integration of personalization and codification tactics to enhance innovation performance. (Kolyasnikov & Kelchevskaya, 2020) assert that enterprises should primarily focus on a single strategy, using the secondary strategy in a supportive role, according to an 80–20 ratio. Simultaneously, as articulated in (Ferreira et al., 2020), some literature advocates for a more equitable approach to the adoption of knowledge management strategies (Cristache et al., 2025b). (Bolisani et al., 2020) assert that concentrating on either personalization or codification is beneficial just for establishing an initial strategic direction; nevertheless, organizations may need to modify their strategic mix over time to get a more balanced integration. The uncertainty in the results about the impact of KM techniques may be attributed to the many definitions of knowledge and the various operationalizations present in the empirical research.

Furthermore, the human-related element that has lately garnered attention as a precursor to innovation, pertinent to this discussion, is to the management of knowledge (Tajeddini & Martin, 2020). The core of knowledge management (KM) related to innovation is that it offers a framework for management to cultivate and improve their organization's capacity for innovation (Ode & Ayavoo, 2020). It delineates an organization's capacity to identify the significance of novel external information and knowledge, integrate it, and implement it, which is essential in influencing inventive production. Expanding on this notion, Bunawan and Ahmad Sham (2024a) assert that an organization's capacity to produce creative results is contingent upon its earlier accumulation of absorbed knowledge. The advent of knowledge management has so improved the interdependence between innovation and knowledge, indicating that inventive endeavors are a consequence of investment in knowledge and knowledge workers. An analysis of pivotal literature in this domain reveals several principal techniques for knowledge management inside an organization. At the strategic level, senior management must see the intellectual capital of organizations as a crucial component of their innovation framework (Bunawan & Ahmad Sham, 2024b). Consequently, companies must formulate an intellectual asset management strategy that emphasizes the enterprise-level administration of certain intellectual assets, including patents and technology (Nahimana, 2024).

At the operational level, firms must enhance the expertise of their human capital and provide knowledge to workers with sufficient resources for communication and information sharing. Consequently, it becomes evident that fostering information exchange is essential, as it serves as a crucial instrument for creativity (Tajeddini & Martin, 2020). Knowledge based view (KBV) posits that a firm's ability to create, integrate, and apply knowledge resources directly influences its innovation capacity and overall performance. KBV suggests that firms should not view codification and personalization as mutually exclusive, but as complementary strategies that together maximize innovation performance. Codification ensures efficiency, standardization, and continuity, while personalization fosters creativity, adaptability, and tacit knowledge exchange. In keeping with the theoretical foundation provided by the Dynamic Capabilities Theory (DCT) advanced by Teece et al. (1997), it was argued that Codified knowledge allows firms to standardize best practices and replicate them across units, ensuring efficiency in innovation processes. Further, The Knowledge-Based View (KBV) of the firm which builds on the Resource-Based View (RBV) emphasizes that knowledge is the most strategically significant resource for organizations. According to (Nahimana, 2024), knowledge, unlike other resources, is unique, difficult to imitate, and provides firms with sustained competitive advantage when effectively managed. KBV posits that a firm's ability to create, integrate, and apply knowledge resources directly influences its innovation capacity and overall performance.

For manufacturing firms in contexts such as Uganda, where resource constraints and high employee turnover are common, KBV underscores the importance of a hybrid knowledge management approach that balances both strategies to sustain innovation performance. The Dynamic Capabilities Theory (DCT), advanced by Teece et al. (1997), emphasizes a firm's ability to integrate, build, and reconfigure internal and external resources to respond effectively to rapidly changing environments. Unlike the Resource-Based View, which focuses on static resources, DCT highlights the dynamic processes that enable organizations to adapt and innovate in turbulent markets. Within this framework, knowledge management strategies—codification and personalization—are viewed as critical dynamic capabilities that enhance a firm's innovation performance. They provide mechanisms through which firms sense opportunities, seize them, and reconfigure resources to maintain competitiveness.

The significance of information sharing is heightened by the fact that intellectual assets, in contrast to physical assets, grow in value via use (Aragon-Correa & Sharma, 2003). The human dimensions of innovation management

primarily target two main objectives. Initially, it establishes an organizational framework for innovation by reducing limitations, fostering adaptability, and sustaining an organic organizational structure. The word context is often defined in a passive fashion, referring to the present or existing characteristics of an organizational setting. Merely seeing the phrase in this manner is insufficient if the objective is to foster creativity. Facilitating innovation requires a proactive delineation of context, including the practices and acts that propel creativity. This underscores the need for firms to cultivate management practices and initiatives that serve as catalysts for motivating and invigorating individuals to innovate by fostering the generation and accumulation of ideas and information. Prior research used econometric analysis to assess the influence of personalization and codification tactics on two critical dimensions of innovation performance: innovation propensity and innovation output.

Codification strategy emphasizes capturing and storing knowledge in explicit formats—such as manuals, databases, and standard operating procedures—making it reusable across organizational units. This approach supports efficiency, process standardization, and incremental innovation by ensuring that critical organizational knowledge is retained even when employees leave (Teece, 2009). On the other hand, personalization strategy emphasizes direct person-to-person interaction, where knowledge is exchanged through mentoring, teamwork, and social networks. This approach is particularly effective in mobilizing tacit knowledge, fostering creativity, and driving radical innovation. In Uganda's manufacturing context, both strategies are highly relevant but underutilized. Many manufacturing firms struggle to codify knowledge due to limited ICT infrastructure and lack of formal documentation practices, leading to knowledge loss and inefficiency.

At the same time, while personalization occurs informally through apprenticeship models and workplace interactions, it is often unstructured and vulnerable to disruptions from labor mobility. As a result, innovation performance in the sector remains below potential, with most firms focusing on survival and incremental improvements rather than breakthrough innovations. Understanding the relationship between knowledge management strategies and innovation performance is therefore critical for strengthening Uganda's manufacturing competitiveness. Codification may enhance process and incremental innovations by promoting organizational memory and efficiency, while personalization may facilitate radical innovations by encouraging creativity and adaptability. However, the extent to which Ugandan manufacturing firms effectively balance these two strategies—and how this balance influences innovation performance—remains underexplored in empirical research. This research will focus on knowledge management techniques and the three pillars of innovation performance: product innovation, process innovation, and corporate social responsibility.

$H0_1$ : Codification Knowledge strategy has no significant effect on innovation performance

$H0_2$ : Personalization knowledge strategy has no significant effect on innovation performance

### III. METHODOLOGY

#### 3.1 Research Design

A cross-sectional explanatory research approach was used to collect and evaluate quantitative data about the study variables. Since the main purpose is to test the effect of knowledge management strategy on innovation performance among manufacturing firms in Uganda, it is preferable to adopt a quantitative research design. The process through data collection until the final analysis is suitable to help examine and explain the relationships among the variables.

#### 3.2 Sampling and Data Collection

This study drew a sample of 363 manufacturing firms across the four regions of Uganda. The survey questionnaire in was distributed among the operations and marketing managers in the different manufacturing firms. These respondents were appropriate for the present study because they had sufficient knowledge of codification knowledge strategy, personalisation knowledge strategy, and innovation performance to be able to provide adequate responses. In this study, quantitative method was preferred to test the research model. The questionnaire based on a five (5) point Likert-type scale was used for data collection. Data was collected during the period from April 2024 to May 2025. At the end of the data collection process, responses from 263 firms were obtained.

#### 3.3 Research Variable Measurement

In this study, codification knowledge strategy, personalisation knowledge strategy and innovation performance of manufacturing firms were measured. To ensure the content validity of the measures, the items were adapted from past studies with only minimal adjustments. Innovation Performance: The study adapted the measure of innovation performance which was proposed by (Duarte & Carvalho, 2025). According to Duarte and Carvalho (2025) innovation performance encompasses three specific areas of firm outcomes. These are the impact of innovation on products and markets, the impact of innovation on processes, and the impact of innovation on corporate social responsibility. A total

of 13 items were used in the questionnaire to capture the scales for impact of innovation on products and markets, impact of innovation on processes and impact of innovation on corporate social responsibility. The impact of innovation on products and markets was measured using seven items, adopted from prior studies (Duarte & Carvalho, 2025) and was modified and used to evaluate innovation performance. The impact of innovation on processes was measured using four items adopted from previous studies (Duarte & Carvalho, 2025). While the impact of innovation on corporate social responsibility was measured using two items adopted from prior research by Duarte and Carvalho (2025).

**Codification Knowledge strategy:** The study adopted the full-range questionnaire that was developed by for measuring codification knowledge strategy. The tool was chosen since it enabled the researcher to assess the extent to which organizations capture, store, and disseminate knowledge in explicit and structured forms a 5-point Likert-type scale was adapted. **Personalisation Knowledge strategy:** The study adopted the full-range questionnaire that was developed by (Nahimana, 2024) for measuring personalisation knowledge strategy. The measurement too in particular, captures the degree to which firms rely on personalization knowledge strategy, which emphasizes tacit knowledge sharing through direct human interaction rather than formal documentation. A 5-point Likert-type scale was adapted.

### 3.4 Data Analysis

Data analysis was conducted using Statistical Packages for Social Sciences (SPSS) version 24.3 to provide descriptive and inferential statistics aligned with the study aims and hypotheses. Descriptive statistics were employed to summarize and elucidate the sample characteristics through frequency tables, means, and standard deviations (Antony et al., 2025), while inferential statistics utilized computed statistics from the sample to derive statistical inferences regarding the population parameters based on the sample data extracted from the population (Singh & Masuku, 2014). The dependability of the research instrument was evaluated using the Cronbach alpha coefficient to determine the internal consistency of the instruments.

The Pearson correlation was used to assess the strength and direction of the linear correlations between the variables. A Hierarchical Regression Model was employed to assess the extent of variance elucidated by the independent variables (codification knowledge strategy, and personalisation knowledge strategy) on the dependent variable (innovation performance), as indicated by the progressive alteration in the  $R^2$  value.

## IV. FINDINGS & DISCUSSION

### 4.1 Firms' Description

Table 1 below presents that the vast majority of the firms (36.9 percent) had between 101 to 200 workers, followed by 61-100 with a percent of 36.5, 31-60 (14.1 percent), 201-500 (8.4 Percent), 500-1000 (2.4 percent), less than 30 employees (1.5 percent) finally more than 1000 had 0.4 percent. This means that most of the manufacturing firms were basically small and medium size enterprises with very few large-scale enterprises. Regarding firm age, 49.8% had been operational for the last 11-20 years, 27.8% had been operational up to between 6-10 years, 15.2% had been operational up to between 21-30 years, while 4.6% had been operational for less than five years, and yet only 2.7% had been operational for more than 30 years. The high number of firms that have operated in the country for the last 11-20 years could be a result of the stable security situations in the country which has encouraged a number of firms to open up businesses in Uganda of recent.

**Table 1**

*Firms' Demographic Characteristics*

Demographic Characteristics	Frequency	Percent
Less than 30 employees	4	1.5
31-60	37	14.1
61-100	96	36.5
101-200	97	36.9
201-500	22	8.4
501-1000	6	2.3
More than 1000 people	1	.4
<b>Total</b>	<b>263</b>	<b>100.0</b>
Less than 5 years	12	4.6
6-10	73	27.8
11-20	131	49.8
21-30	40	15.2
More than 30 years	7	2.7
<b>Total</b>	<b>263</b>	<b>100.0</b>

#### 4.2 Multivariate Outliers

This research used the Mahalanobis distance metric to detect and address multivariate outliers (Lakshmi & Sajesh, 2025). A significant chi-square value was computed using two independent variables as the degrees of freedom to identify outlier situations. An alpha level of .001 was established as per the recommendations of (Lakshmi & Sajesh, 2025). Consequently, instances with Mahalanobis  $D^2$  values below 0.001 were identified as multivariate outliers and removed from the data set. In a study with two predictor variables, the critical value is 16.27 (refer to (Lakshmi & Sajesh, 2025), Table C.4). Consequently, any case with Mahalanobis values exceeding 16.27 was classified as an outlier and subsequently removed from the dataset. In this study, the greatest Mahalanobis value was 14.85, while the least was 0.022.

#### 4.3 Multicollinearity

Multicollinearity arises when two or more predictor variables in a multiple regression model exhibit a high correlation, defined as exceeding 0.8 (Naz et al., 2025). It typically inflates regression estimates, standard errors, and confidence intervals (Osman, 2025). This assumption was evaluated using correlations, tolerance, and the variance inflation factor (VIF). Acceptable tolerance values should exceed 0.20, while VIF values should remain below 10 (Akinwande et al., 2015). Consequently, multicollinearity was not a concern, as all variables demonstrated tolerances above 0.20 and VIFs below 5, as indicated in table 2, with correlations remaining below 0.8.

**Table 2**

*Multi-collinearity of the Independent Variables*

Collinearity Statistics		
Variable	Tolerance	VIF
Codification Knowledge Strategy	.765	1.113
Personalisation Knowledge Strategy]	.672	1.766

#### 4.4 Correlation Results

The Pearson Product Moment Correlation test was used to ascertain the relationship between the study variables. The correlation data shown in Table 3 suggest a positive and significant link between Codification Knowledge Strategy and Innovation Performance ( $r = .686$ ,  $p < 0.01$ ). The results further indicated a substantial and positive correlation between Personalisation Knowledge Strategy and Innovation Performance ( $r = 0.668$ ,  $p < 0.01$ ). The findings indicate that Codification Knowledge Strategy, and Personalisation Knowledge Strategy were anticipated to affect Innovation Performance, as seen in table 3 below;

**Table 3**

*Correlation Statistics for the Study Variables*

Variable	1	2	3
Innovation Performance (1)	1		
Codification Knowledge Strategy (2)	.686**	1	
Personalisation Knowledge Strategy (3)	.668**	.727**	1

\*\* Correlation is significant at the 0.01 level (2-tailed).

#### 4.5 Testing the Effect of Control Variables

Before testing for the hypotheses, the covariates were regressed against the dependent variable (Innovation Performance) to determine the variance in the dependent variable that is explained by the covariates that are: firm size, and firm age. Findings in table 4 below indicate that both firm size and firm age are significant predictors of Innovation Performance  $\beta = -.351$ ,  $P < .05$  and  $\beta = .327$ ,  $P < .05$  respectively with firm size negatively affecting innovation performance, while firm size affects innovation performance positively. The overall model explains .070 variance,  $F = 1.948$ ,  $P < .001$ . This implies that the covariates account for a 7.0 percent change in Innovation Performance.

**Table 4***Testing the Effect of Control Variables*

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.871	.069		56.291	.000		
	Firm Size	-.106	.025	-.351	-4.207	.000	.513	1.948
	Firm Age	.116	.030	.327	3.918	.000	.513	1.948
<b>Model Summary statistics</b>								
R					.265			
R Square					.070			
Adjusted R Square					.063			
Std. Error of the Estimate					.28716			
R Square Change					.070			
F Change					9.792***			
Durbin Watson					1.938			

Dependent Variable: Innovation Performance

#### 4.6 Hypotheses Testing

Hierarchical regression analysis was used to examine the direct impacts of H01, and H02. This strategy elucidated the variation in the outcome variable (Innovation Performance) attributable to the supplementary variable in the model. The calculated test statistics for each model include the coefficient of determination ( $R^2$ ), the unstandardized beta coefficient ( $\beta$ ), and the p-values. The choice to accept or reject a hypothesis was influenced by the significance level (p-value). Hypotheses were not rejected while p-values above 0.05, and were rejected when p-values fell below 0.05 (Whittall & MacKay, 1989).

##### 4.6.1 Codification Knowledge Strategy and Innovation Performance

In table 5 model 2 below the covariates that were firm size and firm age were controlled to determine the impact of codification knowledge strategy on innovation performance ( $H_{01}$ ). Firm size had a significant effect on innovation performance where  $\beta = -.042$ ,  $p < .05$ , while firm age did not have a significant effect on innovation performance  $\beta = .026$ ,  $p > .05$ ). Results also indicate that codification knowledge strategy significantly and positively predicts innovation performance  $\beta = .444$ ,  $p < .001$ . This means that for every unit change in codification knowledge strategy, innovation performance varies by .444. Basing on these results,  $H_{01}$  which stated that there is no significant influence of codification knowledge strategy on innovation performance was rejected. Such results are in agreement with the earlier findings of (Ode & Ayavoo, 2020) who noted that the essence of knowledge management (KM) concerning innovation is that it provides a framework for management in their attempt to develop and enhance their organizational capability to innovate. It defines the ability of an organization to recognize the value of new external information and knowledge, assimilate it, and apply them, and this ability is critical in determining innovative output.

##### 4.6.2 Personalisation Knowledge Strategy and Innovation Performance.

In the third model, the null hypothesis ( $H_{02}$ ) which stated that there is no significant effect personalisation knowledge strategy on innovation performance was tested. In this model, the covariates and codification knowledge strategy were controlled. Firm size and firm age were insignificant at  $\beta = -.072$ ,  $p < .01$  and  $\beta = .093$ ,  $p > .05$  besides a positive and significant effect of codification knowledge strategy on innovation performance ( $\beta = .269$ ,  $p < .001$ ). Results further indicated that personalisation knowledge strategy positively and significantly influences innovation performance  $\beta = .214$ ,  $p < .001$ . This suggests that a unit improvement in personalisation knowledge strategy would lead to a .214 increase in their innovation performance. Against this backdrop, the null hypothesis was rejected. The findings are in line with earlier findings of a study by Bunawan & Ahmad Sham (2024a) who noted that knowledge personalization strategy influences innovation performance by emphasizing direct interaction and sharing of tacit knowledge among employees through discussions, teamwork, mentoring, and social networks. This approach enables individuals to exchange experience-based insights, which are often difficult to codify, thereby fostering creativity and the generation of new ideas.

Through continuous collaboration and knowledge sharing, employees are better able to combine diverse perspectives, solve problems creatively, and develop innovative products and processes, ultimately enhancing innovation performance. Empirical studies show that personalization strategies significantly and positively affect innovation outcomes because they strengthen knowledge sharing and utilization within organizations (Bunawan & Ahmad Sham, 2024c)

**Table 5***The Results for Control Variables and Direct Effects on Innovation Performance*

Predictors	Model 1 Unstandardized Coefficients		Model 1 Unstandardized Coefficients		Model 1 Unstandardized Coefficients	
	B	t	B	t	β.	t
(Constant)	3.871	56.291	2.116	15.194	1.802	13.024
Firm Size	-.106***	-4.207	-.042	-2.186	-.022	-1.160
Firm Age	.116***	3.918	.026	1.135	.033	1.511
CKS	-	-	.444***	14.311	.269***	6.227
PKS	-	-	-	-	.214***	5.509
<b>Model Summary Statistics</b>						
R Square	.070		.481		.535	
Adjusted R Square	.063		.475		.528	
Std. Error	.28716		.21500		.20376	
R Square Change	.070		.411		.055	
Sig. F Change	.000		.000		.000	

Dependent Variable: Innovation Performance

Note: \*p&lt;.05, \*\*p&lt;.01, \*\*\*p&lt;.001, CKS = Codification knowledge strategy, PKS Personalization Knowledge Strategy.

#### 4.7 Discussion

The findings of this study indicate that codification knowledge strategy has a significant influence on innovation performance among manufacturing firms in Uganda ( $\beta=.444$ ,  $p<.001$ ). Codification, which involves capturing, storing, and reusing organizational knowledge in formal systems such as databases, manuals, and standard operating procedures, was found to enhance the firms' ability to generate incremental innovations. This result aligns with earlier studies by (Nahimana, 2024), who argued that codification strategies enable organizations to leverage economies of reuse, thereby improving efficiency and product quality. In the Ugandan context, manufacturing firms often operate in resource-constrained environments where knowledge loss due to high labor turnover and limited managerial capacities is common. Codification appears to mitigate these challenges by ensuring that critical organizational knowledge is preserved and easily accessible to employees. This supports the argument by (Bunawan & Ahmad Sham, 2024b) that codification is particularly beneficial for firms seeking operational stability in dynamic and uncertain business environments. The empirical results of this study revealed that firms with strong codification systems, such as documented work routines and centralized knowledge repositories, reported higher innovation outcomes, especially in process innovation, compared to those relying primarily on tacit, person-dependent knowledge sharing.

However, the study also highlights certain limitations of codification in driving radical innovations. While codification enhances efficiency and incremental improvements, it may inadvertently restrict creativity and adaptability by emphasizing standardized procedures. This concern echoes (Njiru et al., 2025) assertion that over-reliance on codified knowledge can reduce flexibility and slow down the exploration of novel ideas. Ugandan manufacturing firms, particularly small and medium-sized enterprises (SMEs), may thus risk falling into a "knowledge rigidity trap" if codification is not complemented by personalization strategies that encourage interpersonal knowledge exchange. Theoretically, the findings provide support for the Knowledge-Based View (KBV) of the firm, which positions knowledge as the most strategic resource for competitive advantage. Codification enhances the ability of firms to transform individual knowledge into organizational assets, thereby sustaining innovation performance. Despite the positive relationship observed, the study reveals gaps in the institutional and cultural contexts of Ugandan manufacturing firms. Many firms lack standardized knowledge management policies, and some employees resist knowledge documentation due to perceptions that it increases workload or threatens job security. Addressing such cultural barriers is crucial to strengthening codification as a driver of innovation.

The findings further reveal that personalization knowledge strategy exerts a significant influence on the innovation performance of manufacturing firms in Uganda ( $\beta=.214$ ,  $p<.001$ ). Personalization, which emphasizes direct person-to-person knowledge exchange through interactions, teamwork, mentoring, and social networks, was found to be particularly effective in supporting radical and exploratory forms of innovation. This outcome resonates with the arguments of Cristache et al. (2025), who contend that tacit knowledge shared through socialization and collaboration often leads to novel solutions and creative breakthroughs. In the Ugandan manufacturing context, where firms face dynamic customer preferences, supply chain uncertainties, and infrastructural challenges, personalization appears to play a critical role in enabling flexibility and adaptability. Empirical results from this study indicated that firms encouraging open communication channels, face-to-face meetings, and communities of practice reported higher levels of product and market innovation compared to firms that predominantly relied on codification. This aligns with Bunawan

and Ahmad Sham, (2024c) findings that personalization strategies foster deeper understanding, creativity, and problem-solving through trust-based interactions. Additionally, the findings of the study is consistent with the Knowledge-Based View (KBV) of the firm, which emphasizes that competitive advantage depends on the firm's ability to create, integrate, and apply knowledge resources. Personalization facilitates the flow of tacit knowledge, which is difficult to imitate, and therefore strengthens sustainable innovation capabilities. Moreover, personalization was found to be particularly useful for small and medium-sized enterprises (SMEs) in Uganda, which often lack the resources to develop elaborate codification systems. Instead, these firms leverage informal interactions, apprenticeship models, and leadership-driven mentoring to generate innovative solutions to production and market challenges.

Nonetheless, the findings also underscore potential limitations of over-reliance on personalization strategies. While effective for radical innovation, personalization can be inefficient in contexts requiring standardization, scalability, and efficiency. For instance, when experienced employees leave Ugandan manufacturing firms without documenting their knowledge, valuable insights are often lost. This knowledge leakage, coupled with high labor turnover in the sector, threatens the sustainability of innovation outcomes. Therefore, the results suggest that personalization must be complemented by some level of codification to ensure knowledge retention and continuity.

## V. CONCLUSION & RECOMMENDATIONS

### 5.1 Conclusion

In conclusion, the study demonstrates that personalization knowledge strategy positively influences innovation performance, particularly in promoting radical, customer-driven, and adaptive innovations among manufacturing firms in Uganda. However, its sustainability is limited by risks of knowledge loss and dependency on individuals. Further, codification knowledge strategy also positively influences innovation performance in Ugandan manufacturing firms, particularly in enhancing process and incremental product innovations. However, its limitations in fostering radical innovation highlight the need for a balanced approach that integrates both codification and personalization strategies.

### 5.2 Recommendations

Given the positive and significant influence of both knowledge codification and knowledge personalization strategies on innovation performance, it is recommended that manufacturing firms adopt a balanced knowledge management approach that integrates both strategies. Specifically, firms should invest in robust knowledge codification systems—such as databases, standard operating procedures, and digital knowledge repositories—to ensure that critical organizational knowledge is captured, stored, and easily accessible for reuse and continuous improvement. At the same time, organizations should actively promote knowledge personalization through initiatives that facilitate direct interaction among employees, including teamwork, mentorship programs, communities of practice, and cross-functional collaboration. This will enhance the sharing of tacit knowledge, which is essential for creativity and the development of novel solutions. Furthermore, management should align knowledge management strategies with organizational innovation goals by fostering a supportive culture, investing in enabling technologies, and providing continuous training to employees.

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