

The Influence of Cyber Security Implementation Strategy on Organizational Knowledge Management and Performance – A Case Study of Sinapi Aba Savings and Loans in Ghana

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Abstract

Over the years, the quantity of knowledge an organization possesses and how that knowledge is shared and utilized have come to determine its success. However, knowledge management processes underpin the gathering of such knowledge in the attainment of desired success. The study, therefore, examines How knowledge management principles were applied in ensuring cyber security compliance and whether such compliance inspired better or worse performance in the case study organization. A conceptual model of knowledge management processes showing the relationship of knowledge acquisition, knowledge sharing, knowledge utilization and security compliance and its subsequent impact on organizational performance is proposed. The model is tested using data collected from a case study organization in Ghana. The study used structured questionnaires (open and close-ended questions) to collect data. The findings were coded into excel and analyzed using the SPSS software. It was established that organisational knowledge management has an influence on organizational performance.

Keywords: Cyber, Security, Knowledge Management, Strategy, Performance

1. INTRODUCTION

Sinapi Aba Savings and Loans was founded in 1994 to offer live transforming services to clients in order to ensure the economically disadvantaged are given the right opportunities to make a dignified living for themselves. It has provided holistic financial solutions in the fields of Business, Housing, Agricultural, and Education through its wide range of innovative products and services in Information Technology (IT) and is the first savings and loans company in Ghana to be ISO-27001 Certified. This means the company over the years has follow the best practices in information security and has invested in their customers, processes, and technology to Increased reliability and security systems in order to improve customer and business partner confidence.

The collection of methods relating to creating, sharing, using and managing the knowledge and

information at Sinapi Aba to achieve the success of ISO-27001 certification requires careful study especially in Cyber Security Based AI Technology and Regulation on the company's performance. Even though there has been a plethora of studies on the impact of financial technologies on different sectors of the economy in Ghana, the studies are mostly on the impact or effects of financial technology on the financial sectors (Manfred, 2017; Domeher et al., 2014; Asante-Gyabaah et al., 2015). However little work has been done on knowledge management approach to cyber security-based AI technology and regulation on organizational performance. It is obvious now in the post covid-19 era that, knowledge-based economy has become an essential component of the modern firm (Huang et al., 2018). These issues are the vital discussion that needs to be debated in academic circles as knowledge management has emerged as an operational and strategic organizational tool. (Hovav et al., 2021). This is important because Knowledge management boosts the efficiency of an organization's decision-making ability making sure that all employees have access to the overall expertise held within the organization. Additionally, it helps smarter workforce to make quick, informed decisions that benefit the company. Consequently, this paper focuses on sharing the perspectives, ideas, experience and information of Sinapi Aba on the knowledge management approaches used in multidisciplinary ways that has achieve organizational objectives. It is hope this work will add to the body of knowledge on knowledge management approaches as companies touts the strategic benefits of its application, emphasis also must be on security policies and regulations.

1.1 Objectives

The research objectives are as follows:

1. To review Knowledge Management Approach (KMA) and its relations to organizational performance
2. To analyze organizational performance effects on knowledge acquisition
3. To ascertain the impact of cyber security implementation strategy on Organizational Knowledge
4. To find out the impact of knowledge Management on performance
5. To find out factors that affects knowledge utilization in an organization
6. To examine relationship between Cyber Security Implementation Strategy and the organization performance.
7. To determine impact of Cyber regulations on the organizational profitability and the positive relationships between knowledge utilization and organizational performance.

The objectives above were evaluated according to the following research questions:

RQ1: How does cyber security affect the performance of organizations, specifically in the bank?

RQ2: What are the knowledge management processes that are conducted in the organization to support and improve cyber security performance? In what manner these processes impact the cyber security process?

RQ3: In what way does cyber security implementation impact on the knowledge management processes of the bank.

1.2 Hypotheses and suggested Model

The study is based on the following hypotheses:

- H₁: Cyber Security Implementation Strategy will positively affect the organizational Performance.
- H₂: Organizational Knowledge Management will impact on organizational performance
- H₃: Cyber Security Implementation Strategy will positively correlate with the Bank's profit
- H₄: Organizational Knowledge Management will positively boost the efficiency of Bank's decision-making ability and their profit.

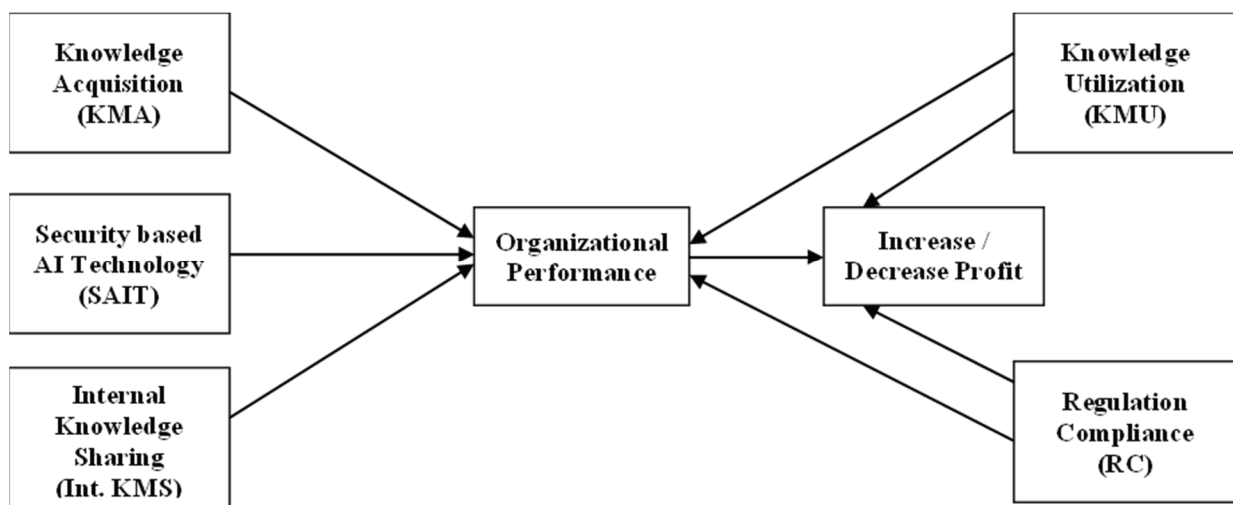


Figure 1: Research Model

The conceptual model in Figure 1 above examines knowledge management approach to cyber security-based AI technology and regulation on organizational performance. The knowledge acquisition, security-based AI regulatory issues and sharing of the knowledge becomes the basic indicators that will impact on organization performance. But there are other exogenous variables like knowledge utilization and cyber regulation that may also impact on the organization performance. These variables are considered because of their external effects to the model and their role of impacting the outcomes in the model. The organizational performance is contextualized as the outcome of the company's activities in its markets and may reflects the extent of the company's profitability and goal achievement and therefore will utilize the increase/ decree variable in the model to measure the organizational performance.

1.3 Theoretical background of variables in the model:

Knowledge Management Approach (KMA) according to Girard and Girard (2015) refers to the organization's ability to acquire information on customers, competitors, markets, and industry. Although, KMA assumes positive implications, it has been said by some researchers that, it is not always the case in today's disruptive digital era (Hovav et al., 2021). This is because the substantial

understanding of the approach lies in the trade-off between future benefits and current tasks making it challenging for business leaders to balance essential near-term goals without compromising long-term competitiveness. Yet the ability of every company to create and leverage knowledge for competitive advantage requires their leadership to set their goals right to meet the markets continuous evolving dynamics.

The variables in this model starts from **Knowledge Acquisition** which involves gathering or collecting knowledge from various sources that results in adding new knowledge to a knowledge base and refining or improving knowledge that was previously acquired. the knowledge acquisition will be done through the process of knowledge elicitation from domain experts, such as domain identification, domain knowledge conceptualization, knowledge formalization and encoding, and knowledge refinement and validation. This laid the foundation for the **Security based AI Technology** which may facilitate tools and techniques that leverage artificial intelligence (AI) to autonomously identify and/or respond to potential cyber threats based on similar or previous activity. This system will be complemented by **Internal Knowledge Sharing** which involves information, skills, or expertise that are shared among management and employees to encourage all in sundry to help each other by working collaboratively and by having opportunities to interact casually during the workday. The resultant of this leads to improvement in productivity (Financial performance, Market performance and Shareholder value). But there is other exogenous variable like **Knowledge Utilization** which is a function of management and employees to systemic specified processes of acquiring, organizing, and communicating both tacit and explicit knowledge, so employees can make use of the knowledge in more effective and productive way in their work, (Alavi & Leidner, 1999). Notwithstanding these variables, the concept of **Cyber Regulation** can also be considered as exogenous variable that may consider directives that safeguard information technology and computer systems for the purposes of forcing companies to protect their systems and information from cyber threats and data breaches. The outcome now may determine the profitability of the company which will be used to measure knowledge management approach to cyber security-based AI technology and regulation on organizational performance.

2. LITERATURE REVIEW

2.1 Knowledge Management

Organizational knowledge is embedded in systems, routines, procedures, policies, documents, and individual employees (Alavi & Leidner, 2001). it is seen as the process by which a company gathers, organizes, shares and analyzes its knowledge in a way that is easily accessible to employees. This is done through process of capturing, storing, sharing and effectively managing the knowledge and experience of employees to increase the workforce's overall knowledge with the primarily aim to improve efficiency, productivity and retain critical information within the company. It is now a fact that, I.T play an important role in the company's ability to apply existing knowledge effectively and to create new knowledge (Alavi & Leidner, 2001). For instance, secure intranets, browsers with dashboards and portals, intelligent search techniques, semantic modeling of knowledge ontologies, contextual taxonomies may be successfully deployed in knowledge management systems to manage intra and inter-firm knowledge. Whereas organizations do manage knowledge internally, there have been calls for companies to consider how external knowledge management is done. This has become important because of multidisciplinary nature of the concept which may have effect on organizational behavior, strategy and even learning processes of the workforce of the company. The operative knowledge management systems require that Sinapi Aba has to promote a knowledge culture and programs in company-wide, work systems, and

intelligent techniques. By the company-wide means effort to collect, store, distribute, and apply digital content and knowledge. The company can have structured knowledge systems that will help in provision of databases and tools for the organization and storing structured documents. On other hand the semi structured knowledge systems will execute databases and tools for organizing and storing semi structured knowledge, like e-mail or other back up system. Other things that may be required is network system that provide directories and tools for locating company's employees with special expertise in tacit knowledge that may comprises search tools, tools for classifying based on a taxonomy, portals and group collaboration tools. Furthermore, there must be support in creation of new knowledge and its integration into the organization (knowledge work systems). This may also require easy access to an external knowledge base like a powerful computer hardware with intensive graphics, analysis, document management, and communications capabilities and a user-friendly interface. Since AI may lack flexibility in terms of human intelligence, it will then be used to capture and preserve tacit knowledge to produce solutions to exact complications that may be massive and complex to be dealt with by human beings. In conclusion Knowledge management are challenging to implement successfully and therefore appropriate organizational and management capital are essential to make these systems successful to help achieve knowledge sharing, promoting employee practice and knowledge culture.

2.2 Cyber Security based AI Technology and Regulation

The regulation of AI is the development of public sector policies and laws for promoting it. The regulatory and policy landscape for AI is an emerging issue in jurisdictions globally, including the European Union and in supra-national bodies like the IEEE, OECD and others. Most business people have concerns about digital technology on the potential abuse of personal data. Customers are becoming uncomfortable with the way companies could track their movements online, often gathering credit card numbers, addresses, and other critical information. These concerns led to measures of guaranteeing internet users some level of control over their personal data and images in USA and Europe. The result is European Union's 2018 General Data Protection Regulation (GDPR) (*General Data Protection Regulation (GDPR) – Official Legal Text*, n.d.). Nonetheless the discussion is entering into a new phase where companies increasingly embed artificial intelligence in their products, services, processes, and decision-making. Other companies' attention has shifted from how data is used by the software to now for example diagnosing of cancer or to approve loan for customers. While regulations are external to the company and are made and enforced by governments, cyber security-based AI Technology policies must be internal to help develop the company. The functions of AI in cybersecurity first is seen in detection of cyber threats and this has been confirmed by 2020 Capgemini report ("World Wealth Report 2020," 2020) which revealed that, more than 50% of organizations have implemented AI-based cybersecurity solutions for detection purposes. The other functions are ability of the organization to detect threats through data scanning and making of predictions based on the system's training. There is also AI ability to help detect attacks and stop them at the same time and all these helps in lowering costs and leads to profit making of the company.

The integration of AI in cybersecurity systems has also some level of limitations. Notably among them is the use of AI by cybercriminals. This makes cyber malicious attackers increase the precision and effectiveness in their work. AI can also be used with phishing attacks and that assist in cybercriminals extract the necessary information and make the malware harder to detect. This has led to some concerns about potential misuse or unintended consequences of AI resulting in the efforts by some institutions like US National Institute of Standards and Technology (NIST) to examine and develop standards that are reliable, robust, and trustworthy AI systems. For example, general artificial intelligence bills or resolutions were introduced in at least 17 states in 2021, and enacted in Alabama, Colorado, Illinois and

Mississippi, (Computer Security Division, 2021). It is therefore imperative that, there is a need of reinforcements to build flexible and dynamic regulatory models to respond to the changes and optimize their impact. The current complex web of regulations will probably impose prohibitive costs on new entrants into emerging technologies' markets through cumbersome compliance costs which will eventually lead to a situation where only large firms could afford to comply.

2.3 Knowledge Management Acquisition and Sharing

Knowledge management is purported to be essential to sustain competitive advantage and continued business success, (Ambula et al., 2017). interestingly, no sole definition can explain the whole picture, as different authors viewed knowledge management from several perspectives which dictates the way they define it. Butt (2017) defined it as a combination of border experience, contextual information, norms and values that give a base for investigating and integrating new information and experiences. This means knowledge management can prevail in people minds from the point of view of daily routine activities. There are systematic phases of which knowledge management helps companies to succeed. The two main ones are knowledge acquisition and knowledge sharing.

The knowledge acquisition involves gathering or collecting knowledge from various sources and also the process of adding new knowledge to a knowledge base and refining or improving knowledge that was previously acquired. It constitutes three distinct phases namely; building a model of Knowledge Based System (modeling), filling the model with domain knowledge (instantiation), and validating the developed Knowledge Based. This happens when a company has determined the needed level of cognitive gap of the employees and therefore wants to replace the current content within the company's explicit and tacit knowledge. The Knowledge acquisition is a complementary capability that enhances a firm's absorptive capability to identify and acquire external information that is critical to its operations (Agbim et al., 2014). On other hand knowledge sharing techniques have been subjected to debate by many scholars of strategy with the majority of companies analyzed indicating that beneficial consequences of their use had been realized (Nzongi, 2018). It is the act of information exchange or understanding of information between or among individuals, teams, communities, or organizations. The shared knowledge can be explicit (meaning procedures and documents) or tacit (intuitive and experience-based). It is also premeditated process that not only reinforces an individual's understanding but helps also create or enhance an archive of accessible knowledge for others.

2.4 Organizational Performance

According to Richard et al. (2009) organizational performance encompasses three specific areas of firm outcomes namely; the financial performance which consist of profits, return on assets, return on investment, product market performance which consist of sales, market share and shareholder return which comprises of total shareholder return, economic value added. Organizations are dependents on information technology innovation and many companies have already adopted AI subfields and techniques in order to adapt or disrupt the market while improving their performance, (Wamba-Taguimdje et al., 2020). Research has proven that many businesses take up AI technology to reduce operational costs, increase efficiency, grow revenue and improve customer experience, (Lorica, 2017). This has made some business to invest in full range of smart technologies like robots, machine learning, data mining, Internet of Things (IoT), natural language processing, amongst others into operational costs, increase efficiency, grow revenue and improve customer experience. Consequently, changes in

corporate environment have reflected into the business management but their intensity and variability are hard to predict. This has encouraged most organizations to deploy the right AI technology to help companies save time and money through automating routine processes and tasks and this has increased productivity and enhanced operational efficiencies. Decisions based on outputs from cognitive technologies help to prevent mistakes and 'human error' which results in high organizational performance.

In recent times, in addition to AI based systems, knowledge economy has become an important value of human resources as knowledge-based competencies are used to transform individual performance of employees and performance of the whole organization. Companies are making efforts to support the workforce of knowledge resources to help accomplish challenges in a competitive market that are likely to achieve organizational performance (Lopes et al., 2017). Organization's sustainability therefore could be seen as increasing attention on how to manage new knowledge of ideas and practices that will expand the business or enhance organizational performance. These processes will create the proper structure and the necessary technological infrastructure in organizations and human-driven placement. Indeed, it is noted that the impact of tangible and intangible knowledge are all assets in the productivity of organization although they are difficult to be conveyed as they are mostly arising from encountering real situations and as a result through real experiences of employees.

Knowledge may exist in individual's mind and only when it is articulated and/or captured and shared becomes encoded in organization. All processes, documents, products, services, facilities and systems assist employees to share what they know. This makes knowledge and organizational performance an integral part for companies to have competitive advantage. The creation and transmission of knowledge are always seen by employees as strategically significant as one of the fundamental processes that determine organizational learning abilities and innovation (Paz Salmador & Bueno, 2007). Thus, organizations may try to put measures as a way on incentives for their employees to share what they know from their previous institutional knowledge which will be captured and retained for the future organizational use. These mechanisms lead to the creation of knowledge through developing ways of encouraging employees of positive values that may help in improving organizational performance. The impact of culture on organizational performance has long been an issue of debate in management and Economics. The positive effect of culture relates to increase synergies and spillovers resulting from association of different viewpoints, and increased opportunities for knowledge recombination. On the contrary, negative effects to communication problems and glitches which arise in conflict resolution.

To create knowledge sharing culture, organizations must develop policies of sharing and dissemination to all employees to help them develop new insights, ideas or products which might result in the formation of creative initiatives. Knowledge management and culture may reflect not only in the visible aspects of the organization, such as its mission and espoused values, but also in the way people act, what they expect of each other and how they share their information, (McDermott & O'Dell, 2001).

2.5 Knowledge Management Sharing and Utilization and Organizational Performance

Knowledge sharing is the process of transferring tacit (undocumented) and explicit (documented) information from one person to another. It is not only increasing productivity, but it also empowers employees to do their jobs effectively and efficiently. The systemic and organizationally specified process for acquiring, organizing, and communicating the knowledge becomes the utilization. The

benefit of knowledge sharing in organizations is that employees with expertise pass everything they know on to others. The value of knowledge sharing sometimes becomes critical as most employees sometimes are reluctant and therefore knowledge sharing remains unshared. The assumption is that leadership must play a critical role in facilitating knowledge sharing within a team. The challenge is the trust in the knowledge sharing by the leadership but when this is overcome, it enhances team performance and strengthens employees' competitive advantage by leveraging the collective knowledge of a team.

The knowledge utilization of team members develops through transactive processes that promote coordination. Team performance based on members' utilization of specialized knowledge is less known according to Reagans et al. (2016), however, about the consequences for team performance when team members only possess one of the two productivity factors. Team members' inability to coordinate their collective efforts, utilizing knowledge may undermine team performance. Reagans et al. (2016) posit that, differentiated knowledge among employees of an organization requires different kinds of coordination which may include unprogrammed or relational that may occur among team members as they accomplish their tasks. This kind of unprogrammed or relational coordination often forms and adapts as the team performs its task and has been found to contribute to team performance, especially under uncertain conditions. The end results accentuate that as team members work together, they develop their own language and short-hand terms to describe elements of their work context.

The verbal and nonverbal common language components among team members will therefore reflect how team members represent their environments with shared language facilities thereby improving their performance through effective coordination. The joint influence of knowledge utilization and coordination on team performance helps to prevent repeated missteps, guides product development, sharing internal and external feedback.

3. METHODOLOGY

The study was conducted using Sinapi Aba Savings and Loans (SASL) Company as a case study. SASL's programme involves provision of savings and loans services to the economically active but disadvantaged individuals in Ghana. It is headquartered in Kumasi, the capital of Ashanti region. It currently operates through a network of 44 branches dotted across all the administrative regions and some district capitals of the country. The study employed qualitative research techniques to gather data for analysis. This technique was chosen because of the nature of the study which intends to derive "more depth" data from the encounters of participating respondents.

Data were collected from both primary and secondary sources. This mix of methods and sources resulted in a well-rounded, yet current, insight into the subject area. Primary data was collected using open ended questions for socio-demographic information and closed questions to obtain information related to the explored domain.

The closed questions were in the form of a five (5) pointer Likert scale multiple choice questions, where the respondents are required to complete the questionnaire that needs them to indicate the extent to which they agree or disagree and was assessed with the following scale:

- | | | | |
|------|-------------------|---|---|
| i. | Strongly agree | = | 1 |
| ii. | Agree | = | 2 |
| iii. | Uncertain | = | 3 |
| iv. | Disagree | = | 4 |
| v. | Strongly disagree | = | 5 |

3.1 Research Subjects

The subjects had the following attributes: The mean value of number years of employment of staff in the organization was 7.17; With a low level of performance (M=1.61). 97% of them (68/70) have good knowledge in knowledge management. 4.3% of them work in Finance department. 38.6% of them work as relationship officer and 11.4% in Information Technology department.

The dependent variable was organizational performance and the independent variables were process knowledge; process of new knowledge; have indication on KM; understanding of KM; responsibility on cyber security managing risks and strategy implementation.

3.2 Instruments for data collection and measures

The study consisted an initial pilot survey distributed by e-mail to 70 participants. The survey consisted two parts: Socio-demographic questions and questions related to the explored domain. All questions were based on valid questions adopted from the literature (Hovav et al., 2021). The data was coded into excel and was analyzed by the SPSS software.

Two types of analysis were made to initially explore the hypothesis: 1. Pearson correlation analysis and 2. Linear Regression to examine the correlations between the dependent variables and the independent ones.

4. RESULTS

4.1 Correlation Analysis

		Correlations							
		Perfforman ce	Process Knowledge	Process new knowledge	Have indication on KM	understand KM	officer repnsibili e	Manage risk	Positive relations
Perfforman ce	Pearson Correlation	1	.417**	0.180	.487**	.529**	.278*	.300*	.487**
	Sig. (2- tailed)		0.000	0.136	0.000	0.000	0.020	0.012	0.000
	N	70	70	70	70	70	70	70	70
Process Knowledge	Pearson Correlation	.417**	1	.477**	.401**	.391**	0.054	.338**	.414**
	Sig. (2- tailed)	0.000		0.000	0.001	0.001	0.656	0.004	0.000
	N	70	70	70	70	70	70	70	70
Process new knowledge	Pearson Correlation	0.180	.477**	1	.456**	.356**	0.147	.302*	.342**
	Sig. (2- tailed)	0.136	0.000		0.000	0.003	0.226	0.011	0.004
	N	70	70	70	70	70	70	70	70
Have indication on KM	Pearson Correlation	.487**	.401**	.456**	1	.505**	0.187	.324**	.482**
	Sig. (2- tailed)	0.000	0.001	0.000		0.000	0.122	0.006	0.000
	N	70	70	70	70	70	70	70	70
understand KM	Pearson Correlation	.529**	.391**	.356**	.505**	1	.368**	.311**	.464**
	Sig. (2- tailed)	0.000	0.001	0.003	0.000		0.002	0.009	0.000
	N	70	70	70	70	70	70	70	70
officer repnsibili e	Pearson Correlation	.278*	0.054	0.147	0.187	.368**	1	.278*	.298*
	Sig. (2- tailed)	0.020	0.656	0.226	0.122	0.002		0.020	0.012
	N	70	70	70	70	70	70	70	70
Manage risk	Pearson Correlation	.300*	.338**	.302*	.324**	.311**	.278*	1	.368**
	Sig. (2- tailed)	0.012	0.004	0.011	0.006	0.009	0.020		0.002
	N	70	70	70	70	70	70	70	70
Positive relations	Pearson Correlation	.487**	.414**	.342**	.482**	.464**	.298*	.368**	1
	Sig. (2- tailed)	0.000	0.000	0.004	0.000	0.000	0.012	0.002	
	N	70	70	70	70	70	70	70	70
Implement strategy	Pearson Correlation	.369**	.278*	.242*	.419**	.382**	0.128	0.167	.523**
	Sig. (2- tailed)	0.002	0.020	0.044	0.000	0.001	0.292	0.168	0.000
	N	70	70	70	70	70	70	70	70

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

**. Correlation is significant at the 0.05 level (2-tailed).

Table 1: Pearson correlation of dependent and independent variables

4.2 Linear Regression Analysis

		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	.199	.276		.720	.474
	Process Knowledge	.283	.133	.252	2.132	.037
	Process new knowledge	-.253	.136	-.218	-1.867	.067
	Have indication on KM	.243	.116	.259	2.086	.041
	understand KM	.282	.129	.272	2.185	.033
	officer repsonsible	.128	.117	.117	1.096	.277
	Manage risk	.061	.108	.061	.564	.575
	Implement strategy	.131	.126	.114	1.044	.301

a. Dependent Variable: Performance

Table 2: Linear Regression among the explored variables

5. Discussion and Conclusions

Correlation analysis indicates several interesting outcomes: There is a moderate correlation between the process of knowledge and the process of new knowledge ($r=.477$), In addition, the indication of KM is moderated and correlated with the process of new knowledge ($r=.456$). It was also found that the Understanding KM and the indication of KM are strongly correlated ($r=.505$). Moreover, the linear regression conducted between the dependent variable (Organizational Performance) and several Independent variables (Process Knowledge; Process of new knowledge; Have indication on KM; Understanding KM; Having responsibility on data; Managing Risks and Implementation of strategy) shows that only the following variable contributes to the prediction of the organization performance: Process of knowledge ($P<.05$); Have indication on KM ($P<.05$) and Understand KM ($P<.05$). These initial results support hypothesis 2 while showing that organizational knowledge management has an influence on organizational performance. However, to strengthen the paper quality, We intend to conduct additional analysis as well as evaluate the rest of the hypotheses.

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