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A WELL-DEVELOPED SOFTWARE TO INTEGRATE KNOWLEDGE MANAGEMENT PROCESSES INTO THE SUPPLY CHAIN PHASES

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***Abstract*— The paper introduces a new software called Software Service Supply Chain Knowledge Base CLOUD (SSSC KB CLOUD). The software provides a novel solution for knowledge capture and sharing during the development of the clients' software projects. The main aim of this software is to facilitate sharing, transferring, retrieving, and retaining of knowledge among the experts' group who are engaged in the different phases of the software development process. The software also provides a comprehensive management tool for daily work and tasks. It provides functions and abilities to ensure effective communication, search, and knowledge retrieval. In addition, the proposed software forms the group of experts who will complete and work on the new project and provides a mechanism to perform monitoring, reporting, tracking, and knowledge mining. The research also conducts quantitative testing to confirm the software's functionality and efficiency; a questionnaire was well-developed and distributed among users in two different settings: three universities and a software company, then data was collected, and results were verified on whether the software improved the overall business productivity and knowledge externalization.**

Keywords— **Knowledge Management, Software Service Supply Chain, Knowledge Base CLOUD, Knowledge Capture, Knowledge Sharing, Software Development**

I. BACKGROUND OF THE STUDY

In 2016, an extensive literature review discussed the existing Knowledge Management (KM) processes and introduced a new KM process for the software development service companies [1]. They established and defined a new type of Supply Chain (SC) for the software development services companies, called a Software Service Supply Chain (SSSC) [1]. The authors then proposed a framework for SSSC that sets its phases, emphasizing knowledge externalization among its experts who are involved in the software's developmental process [1]. This framework forms the basis for the proposed software in this paper. Furthermore, in 2017, the authors took their research further and conducted a comparative analysis with existing frameworks to test the efficiency of the SSSC framework [2]. Their research found that the SSSC framework adds value to the existing research and could be adopted by SC participants as a practical knowledge-based framework [2]. Their study tested the efficiency and functionality of the proposed SSSC framework, which forms the basis of the proposed software of this paper. Moreover, in 2022, Baydoun and Ahmad [3] defined and introduced a new term, "Software Service Supply Chain Knowledge Base CLOUD (SSSC KB CLOUD)"[3]. It is interchangeable with the term SSSC KB (mentioned in the previous publication [2]. The authors developed a new framework for SSSC KB CLOUD, discussed and explored the main possible technical components of SSSC KB CLOUD, including Knowledge Cloud Management System, Artificial Intelligence Analysis/ SSSC Knowledge Mining, Meta Knowledge, Prior Projects Knowledge Marts and Experts' Base [3]. Their publication introduced the main theoretical structure of the proposed software in this paper.

Based on the existing literature, stated that "If a service is not utilized/ adopted when available, it is retained for future use.". The latter implies that the unused software must be documented and stored in the company's knowledge base computer system for future utilization in the software industry. Moreover, other studies posit that there are unparallel benefits in integrating KM concepts in the SC [4, 5]. KM improves the overall functionality of the SC based on the benefits of the employees' accumulated knowledge as a result of their involvement in fulfilling the clients' projects requirements [6]. In addition, KM has a significant impact on SC performance which is positively moderated by Information Technology (IT) systems support and SC integration [4, 5]. Therefore, due to the complicated human involvements in the KM processes, there is a need to systemize these processes in the SSSC operations. A computer system can then perform and execute the KM initiatives. Thus, the knowledge created could be systematically captured, transferred, and then retained in the SSSC KB system. Of interest, Choi, Lee [7] reported that organizations invest heavily in electronic systems, aiming to increase their ability to manage the vast array of knowledge.

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In this context, some questions were raised, including how organizations process and manage their knowledge and how they capture and transfer their employees' knowledge to be stored and utilized in future projects and decision-making. Although the literature provides enough research on KM, most of which approach KM from a theoretical perspective, some unanswered questions arise from how KM initiative would be integrated within the SC phases (where KM fits in the SC developmental phases) and from how the existing Information Communication Technology (ICT) and computer system can be employed in order to organize and manage knowledge. Interestingly, this paper introduces software that automates the amalgamation between KM and the SSSC phases. It shows the results of the analysis of a well-developed questionnaire-based quantitative test to investigate the functionality of the developed software, its validity and reliability, and to confirm its aims. The latter is to propose and develop new software, "SSSC KM CLOUD", to automate the SSSC framework [1], which was tested later by [2].

Before we go any further, let us explore the definitions of the main terms in this paper (KM and SSSC). [1] defined KM as "a process of identifying the knowledge sources in the SC and then transfers this knowledge from tacit knowledge into explicit knowledge in order to be retained in the SC knowledge base and then retrieve it by the SC participants and share it across the SC when needed". Furthermore, [2] defined SSSC as a set of activities that fulfill clients' requirements of the software, starting from the client's need of the software, followed by developing the said software and testing it to ensure that it performs all the required functions; at the end, the demanded software is deployed at the clients' premises.

II. II. Materials & Methods

A. The research's software development –

This software fulfills the literature requirement of moving KM initiatives' application toward a practical and systemic approach during the SSSC tasks. The research's software results from extensive work because of the significant involvements and considerations to be taken before and during the development process. The introduced software provides a unique solution for knowledge capture and sharing during the SSSC.

B. The research's software design and prototype –

The research software architecture is designed and developed based on the university's library system's structure. The software planning and prototyping are accurately developed. Four different types of prototypes were developed to assess the clarity and achieve the anticipated aim of this software, ensuring knowledge capture and complete atomization of the software. Figure 1 is the adapted prototype which summarizes all the developed four prototypes.

C. The research's aims and software novelty –

[8-11] stress the importance of KM during the SC development process. However, very few attempts were made to develop a functional software to be implemented at the organizational group level, specifically during organizations' SCs. Therefore, KM remains intangible/ unachievable and is still considered a theoretical rather than a functional concept. The research's introduced software is, to our knowledge, among the first knowledge's implementation in organizations and educational institutions. The author's introduced frameworks (published in [1], named the SSSC framework and the KM framework, are systematized in this software to achieve the aim of the study.

D. The research's software functionalities –

Once the new SSSC project is analyzed, the expert creates a template that specifies the new project's requirements. This template is integral to the software because when it is uploaded into the developed software, it triggers the system's development process of the project by creating a group of experts as members, sets a workspace, etc.… (Figure 1). This template is then uploaded into the SSSC KB CLOUD, and the software performs the following steps. Figure 2 simulates SSSC KB CLOUD software functionalities:

- Initiating a new project.
- Forming a group of experts.
- Informing, via text message, the group members of their involvement in the project.
- Allocating/ creating a workspace in the SSSC KB CLOUD for the new project as an interface for all group work during the project's development.
- Searching for similar previously captured/ retained knowledge (identical to the new project) and attaching them to the workspace, making it available to the group's members by granting them access permission.
- Permitting the experts to search/ view only/ print out/ retrieve knowledge from the SSSC KB CLOUD.
- Equipping the workspace with a chat room and tasks' logs area where the group members can communicate, explain, solve problems, discuss and capture knowledge during all phases of the SSSCs.
- Giving the group members the ability and permission to invite and add new experts to the workspace when needed.
- Providing the group with the ability to terminate and finalize the new project.
- Sending a notification message to the administration and closing the project upon the project's completion.
- Retaining a complete record of the project's workspace, including entries and attachments in the SSSC KB CLOUD for future use.

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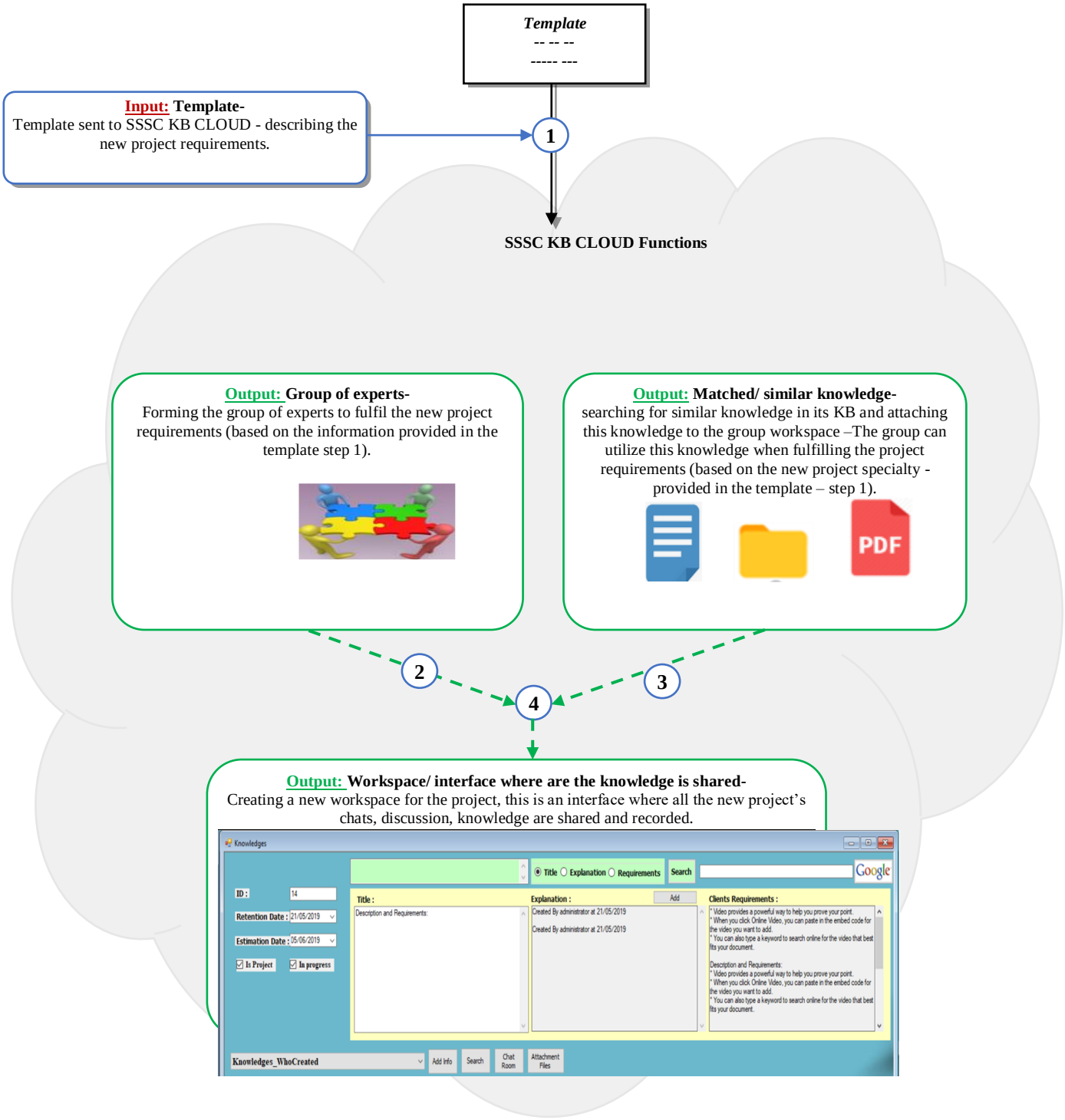

Fig. 1. SSSC KB CLOUD Software Prototype

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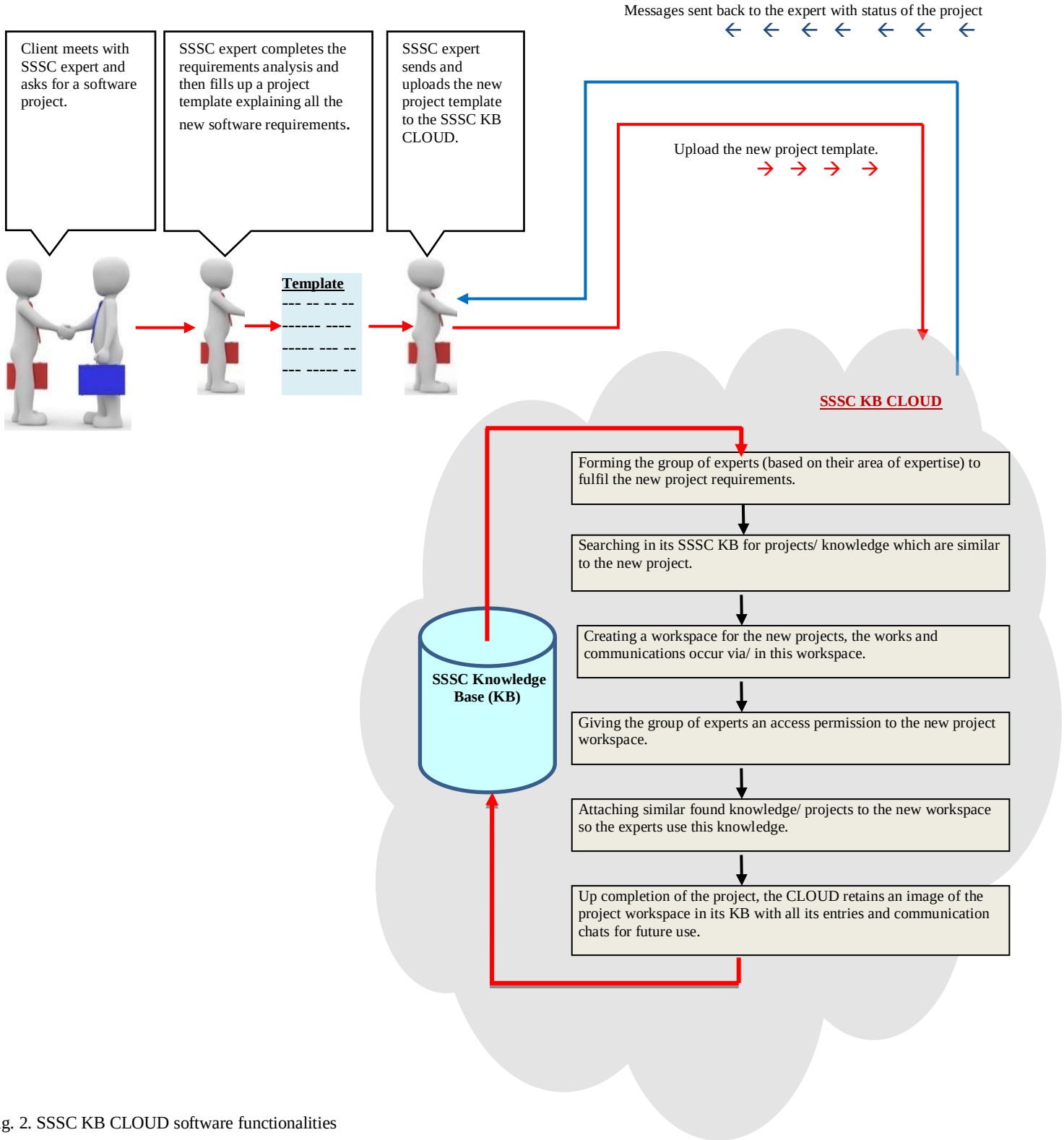

Fig. 2. SSSC KB CLOUD software functionalities

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E. The research's software contents and platforms –

SQL server 2014 was used to develop the SSSC KB CLOUD software. The KB tables and queries used to store and manipulate knowledge were developed using Microsoft SQL. The tables were carefully linked together to achieve the aim of the relational functional KB. Forty-Two tables were used as storage for the knowledge acquired by the system. In addition, all the codes and forms' design and creation were developed using the Microsoft Visual Basic.Net platform. To cover all the software requirements, 24 forms, including around 1000 lines of codes, were written and created.

F. Experiment, questionnaire and data collection –

A questionnaire-based quantitative test was administered to justify the successfulness of the proposed software functionalities; the developed software's validity and reliability were tested against the data collected during experiments performed in businesses and universities. The questionnaires were sent to various organizations (one software development company and three universities). Of note, two versions were developed from the questionnaire: one version targets the software company's management employees and lecturers, and the second version targets the university's students and the software company's experts. The latter lacked some of the questions, and it aims to test and assess the users' experiences with the tested software. However, the version targeting the software company's management and lecturers had more questions that aimed to test and assess the overall performance, efficiency, and productivity of the SCs. The study was done after securing permission to test and install the system in these institutions. To ensure a broader range of testing samples, the test was conducted on third-year university students studying software development and a regional/ local software company experts who develop and sell software to clients. Hundred and Fifty participants were involved and selected based on their willingness to participate. Eight participants were excluded; hence, a total of hundred and forty-two participated in the questionnaires. The participants used the software for a specified period set to complete their projects (3-4 months for university students, during a semester's project development, and 4 months for the software company, during software development). Upon completion of the development, the participants were asked to complete the questionnaire.

III. Results & Discussion

The results reflected the participants' experience with the software as KM initiatives for knowledge capture, sharing, transferring, and retention. According to the participants' experience with the proposed software, the results reveal that the participants' knowledge sharing and knowledge capture abilities had improved. The results demonstrated that the participants were aware of others' works in the groups and that the software allowed them to share what they knew and to easily access and search the KB when they sought past knowledge.

A. Knowledge capturing, transferring, retainin, and sharing –

The following summarizes the test results of the users' experiences with the software related to knowledge capture, transfer, retention, and sharing.

- **Knowledge capture** is the knowledge that the group members accumulate due to their collaboration in using the system during the software development process [12]. The results demonstrated that the software helped participants improve their knowledge capture and acquisition; Around 66.5% of the participants strongly agreed/ agreed with the question: "Is the software an excellent tool for knowledge capture?" whereas 33.3% neither agreed nor disagreed. Moreover, 69.2% of the participants strongly agreed/ agreed with the question "Is the software an excellent tool for knowledge acquisition?" whereas 30.8% neither agreed nor disagreed. In addition, 86% of the participants strongly agreed/ agreed with the question: "Does the exposure to past learnt lessons improve my knowledge?", however, 5.6% of the participants disagreed. Table 1 shows the test result for the research software's ability to increase knowledge capture and acquisition.

Table -1 Summary of knowledge capture test results

Knowledge capture test results			
Questions	Results (%)		
	Strongly agree/ agree	Neither agree nor disagree	Disagree
Is the software an excellent tool for knowledge capture?	66.5	33.3	None
Is the software an excellent tool for knowledge acquisition?	69.2	30.8	None
Does the exposure to past learnt lessons improve your knowledge?	86	8.45	5.6

The literature confirms that knowledge capture among SCs group members simulates the overall SC performance and productivity [13]. In this context, Liebowitz and Megbolugbe [14] proposed that with the current advanced technologies such as Web-based and Intranet technologies, the SC managers could ensure proper and fundamental infrastructures and communication tools to allow knowledge capture and sharing within groups. Matsumoto, Stapleton [15] argued that there is

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no definitive way to capture knowledge; it is, therefore, essential to allow a certain amount of flexibility in the knowledge capture process. Then, the authors developed a knowledge-capture approach, focusing on the capturing part of the whole KM process; their research found knowledge capture allows organizations to make a business assessment and achieve maximum returns [15].

- **Knowledge transfer** is the knowledge that transfers across the organization to reach different individuals, groups, and phases of SSSC using tools and facilities the research software provided tools and facilities [16]. The results also demonstrated that the proposed software offers good functionalities for transferring knowledge while developing and fulfilling the project. The research software incorporates chat rooms and discussion boards that facilitate and encourage knowledge sharing and communication among groups. Around 85.2% of the participants strongly agreed/ agreed with the question: "Does sharing others' completed projects chat rooms help you resolve technical problems quickly?" whereas 2.8% disagreed. Besides, 63.8% of the test participants strongly agreed/ agreed with the question: "Does the reporting facility help you find the proper knowledge and support?" whereas 3.6% disagreed. Furthermore, 79% of the participants strongly agreed/ agreed with the question "Does the software simplify and improve the overall communication among the company's experts?", however, 3.6% disagreed. Table 2 illustrates the test results of knowledge transfer.

Table -2 Summary of knowledge transfer test results

Knowledge transfer test results			
Questions	Results (%)		
	Strongly agree/agree	Neither agree nor disagree	Disagree
Does sharing others' completed projects chat rooms help you resolve technical problems?	85.2	11.9	2.8
Does the reporting facility help you find the proper knowledge and support?	63.8	32.6	3.6
Does the software simplify and improve the overall communication among the company's experts?	79	17.39	3.6

- According to the literature, Blome, Schoenherr [17] posited a positive and significant influence of knowledge transfer on SC flexibility and performance, and they confirmed that the effective knowledge transfer among SC participants improves the SC flexibility. Furthermore, He, Gallear [18] examined the operational characteristics of SCs and identified the attributes that cultivate knowledge transfer. The findings support the view that trust, commitment, and shared meaning facilitate knowledge transfer in SC, influencing overall SC productivity [18].

- **Knowledge retention** is the ability of the research software to retain the individuals/ groups captured/transferred knowledge for future use [19]. Upon project completion, the software captures a full image of the workspace and retains its contents/ entries (including chat rooms discussion, attachments, problem-solving, etc.) for future use. The test results clearly indicated the software's ability as a "knowledge retention tool". Data analysis results had shown that 64.5% of the participants strongly agreed/ agreed with the question: "Did the software exceed your expectations as a knowledge-based system?" whereas 3.6% disagreed. Besides, 68.2% of the test participants strongly agreed/ agreed with the question: "Did the software allow you to access previous projects' processes easily?" whereas 3.5% disagreed. Table 3 depicts the test result of knowledge retention.

Table 3: Summary of knowledge retention test results

Knowledge retention test results			
Questions	Results (%)		
	Strongly agree/ agree	Neither agree nor disagree	Disagree
Did the software exceed your expectations as a knowledge-based system?	64.5	31.4	3.6
Did the software allow you to access previous projects' processes easily?	68.2	28.1	3.5

To support our argument, Marsh and Stock [20] proposed a study to define the influences of effective knowledge retention on the organization's ability to integrate knowledge developed in previous projects. The authors collected data from different firms to confirm and test their research results. The findings suggest that knowledge retention positively impacts a firm's new products and services development performance (Marsh & Stock 2006).

- **Knowledge sharing** is the knowledge the individuals exchange among/ between them using the software [21]. The test results demonstrated that the research software has a clear impact on improving the participants' knowledge sharing. The analysis of the respondents' answers to the questionnaire revealed that 78.1% of the participants strongly agreed/ agreed with the question: "Overall, does the software

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improve sharing knowledge among your group members?" while 5% disagreed. Besides, 78.2% of the test participants strongly agreed/ agreed with the question: "Overall, did the software improve your confidence in sharing what you know?" whereas 3.6% disagreed. Furthermore, 66.6% of the participants strongly agreed/agreed with the question: "Was the level of access permission provided to you adequate to share knowledge?" while 6.5% disagreed. Table 4 shows the test results that demonstrated the knowledge sharing functionality of the research software.

Table 4: Summary of knowledge sharing test results

Knowledge sharing test results			
Questions	Results (%)		
	Strongly agree/ agree	Neither agree nor disagree	Disagree
Overall, does the software improves sharing knowledge among your group?	78.1	15.5	5
Overall, did the software improve your confidence in sharing what you know?	78.2	18.1	3.6
Was the level of access permission provided to you adequate to share knowledge?	66.6	26.8	6.5

Li and Hu [22] analyzed the impact of knowledge sharing in SC; their study concluded that knowledge sharing helps SC maximize total revenue and improve SC efficiency. In this context, to examine how knowledge sharing benefits the SC, Myers and Cheung [23] studied more than 100 cross-national SC partnerships in the industrial chemicals, consumer durables, industrial packaging, toy, and apparel industries in 19 country locations. They found that sharing knowledge enhanced SC performance. They also claimed that sharing knowledge contributed to profitability and operating efficiency, benefiting both members in SC [23]. Moreover, Bessant, Kaplinsky [24] and Peterson [25] stated that SCs managers must eliminate some constraining factors that might stop confidence in knowledge sharing among their groups. These factors include lack of trust, lack of awareness of sector problems, lack of consensus, lack of structure, and lack of strategic focus.

B. Participants' performance and productivity –

The following summarizes the users' experiences with the software in relation to improving participants' performance and productivity.

- Improvement of participants' performance is the ability of the system to enhance and improve the performance of the participants involved in the software development process [26]. The results revealed that the participants' performance has considerably improved following the use of the software. The test results showed that 86.6% of the participants strongly agreed/ agreed with the question: "Overall, did the software improve your performance?" while 3.6% disagreed. Besides, 66.9% of the test participants strongly agreed/ agreed with the question "Are you confident that using the software adds to your overall performance in your projects?" whereas none disagreed. However, 33.1% neither agreed nor disagreed. Furthermore, 64% of the participants strongly agreed/ agreed with the question: "Did the software increase your performance as a group member?" while 3.5% disagreed. Table 5 indicates the statistical results that show the tested software's ability to improve the participants' performance.

Table 5: Summary of participants' performance test results

Participants' performance test results			
Questions	Results (%)		
	Strongly agree/ agree	Neither agree nor disagree	Disagree
Overall, did the software improve your performance?	86.6	8.7	3.6
Are you confident that using the software adds to your overall performance in your projects?	66.9	33.1	None
Did the software increase your performance as a group member?	64	32.3	3.5

Nawaz and Shaukat [27] collected data from 407 manufacturing organizations to find the impact of KM practices on innovation and firm performance. The findings showed a significant and positive link between KM practice and firm performance [27].

- **Improvement of participants' productivity** is the ability of the system to enhance and improve the productivity of the participants involved in the software development process [28]. The results demonstrated improvements in the participants' overall productivity. Around 82.5% of the participants strongly agreed/ agreed with the question: "Overall, did the software improve your productivity?" while 3.6% disagreed and 13.7% neither agreed nor disagreed. Table 6 highlights the result of the test that revealed the improvement of participants' productivity.

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Table -6 Summary of participants' performance test results

Participants' productivity test results			
Questions	Results (%)		
	Strongly agree/ agree	Neither agree nor disagree	Disagree
Overall, did the software improve your productivity?	82.5	13.7	3.6

Referring to the literature, Kianto, Shujahat [29] examined the influence of KM on the experts' productivity. The results indicated that knowledge creation and utilization positively impact knowledge experts' productivity [29].

C. Test results of SC's speed, performance, efficiency, and productivity –

The test results also indicated a significant impact of the research software on the overall SC speed, performance, efficiency, and productivity. The following summarizes the improvement of the SC speed, performance, efficiency, and productivity.

- **Improvement SC' overall speed:** is the ability of the system to speed up and improve the overall operations of the organization SC [30]. The test results revealed that the participants found the tested software a great tool to speed up the overall SC operations and processes. Around 77.5% of the participants strongly agreed/ agreed with the question, "Does the software improve the overall speed of the company's SC?" while 7.2% disagreed and 15.2% neither agreed nor disagreed. Besides, 82.6% of the test participants strongly agreed/ agreed with the question: "Does the automated group formation process speed up the group formation and the initialization of the new project?" whereas 5.7% of the participants disagreed, and 11.5% neither agreed nor disagreed. Table 7 shows the results that prove the improvement of the overall SC speed.

- **Improvement of SC's overall performance:** is the ability of the system to enhance and improve the overall performance of the organization SC [31]. The test results revealed that SSSC KB CLOUD adaptation in the SC leads to the overall SC performance improvement. Around 82.4% of the participants strongly agreed/ agreed with the question: "Does the software improve the overall performance of the company's experts of the SC?" while 7.2% disagreed and 10.14% neither agreed nor disagreed. Table 8 shows the results of improvements in overall SC performance.

Table -7 Summary of overall SC speed test results

Overall SC speed test results			
Questions	Results (%)		
	Strongly agree/agree	Neither agree nor disagree	Disagree
Does the software improve the overall speed of the company's supply chain?	77.5	15.2	7.2
Does the automated group formation process speed up the group formation and the initialization of the new project?	82.6	11.5	5.7

Table 8: Summary of overall SC performance test results

Overall SC performance test results			
Questions	Results (%)		
	Strongly agree/ agree	Neither agree nor disagree	Disagree
Does the software improve the overall performance of the company's experts of the SC?	82.4	10.14	7.2

Hult, Ketchen Jr [32] presented a KM process model and tested nine hypotheses to explain substantial cycle time variables over 58 strategic SCs. Their study revealed a strong link between KM and reduced cycle time, proving that a common point of view concerning quality and speed may improve SC performance [32]. Therefore, adapting the tested software in the company's SC promises an overall SC performance improvement.

- **Improvement of SC's overall efficiency:** it is the system's ability to improve the organization's SC's overall efficiency [33]. There was also a clear indication in the revealed testing results that SSSC KB CLOUD impacts and improves the overall efficiency of the companies' SCs. Around 71% of the participants strongly agreed/ agreed with the question: "Does the software improve the overall efficiency of the company's SC?" while 3.6% disagreed and 25.3% neither agreed nor

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disagreed. Table 9 illustrates the test results that indicated the improvement of overall SC efficiency.

Table 9: Summary of overall SC efficiency test results

Overall SC efficiency test results			
Questions	Results (%)		
	Strongly agree/ agree	Neither agree nor disagree	Disagree
Does the software improve the overall efficiency of the company's SC?	71	25.3	3.6

Therefore, adapting the tested software in the company's SC promises an overall SC efficiency improvement.

- **Improvement of SC's overall productivity:** it is the ability of the SSSC KB CLOUD to improve the overall productivity of the organization SC [34]. The test results also reveal that adapting the tested software in the company's SC leads to improvement in overall SC productivity. Around 79% of the participants strongly agreed/ agreed with the question: "Does the software improve the overall productivity of the company's SC?" while none disagreed, and 21% neither agreed nor disagreed. Table 10 displays the test results that confirmed the tested software's ability to improve the overall productivity of the SC.

Table 10: Summary of overall SC productivity test results

Overall SC productivity test results			
Questions	Results (%)		
	Strongly agree/ agree	Neither agree nor disagree	Disagree
Does the software improve the overall productivity of the company's SC?	79	21	None

Kremp and Mairesse [35] examined the use of KM concepts in the French manufacturing SCs; their study confirmed that KM, indeed, contributes significantly to its firm innovative performance and its productivity.

D. Cross-tabulation test results

Moreover, in order to produce a concrete testing result, a cross-tabulation was conducted after regenerating new variables, namely, Dimension 1 (Usability testing), Dimension 2 (Accessibility, Credibility, and Desirability testing), Dimension 3 (Knowledge sharing), Dimension 4 (Speed, Performance, Efficiency, and Productivity of the Company's SC) and All dimensions (overall reliability of the research sample), each dimension incorporated a set of sub-questions. Interestingly, after testing the relationships between all proposed dimensions, the results indicated a robust relationship between knowledge sharing and usability, presented by Pearson's R of 0.544 with a level of statistical significance of 99%. Furthermore, the results also reflected a solid relationship between knowledge sharing and accessibility, credibility, and desirability testing, which is presented by Pearson's correlation coefficient of 0.358, with a level of statistical significance of 99%. Finally, Cronbach's Alpha was used to study the reliability analyses of all test samples. The test's results showed that Cronbach's Alpha for Dimension 1 is 84.1. In addition, the reliability analyses of the tested samples represented by Cronbach's Alpha indicated that Dimension 3 reliability is 96.8% and Dimension 4 reliability is 96%. Finally, the overall reliability analyses of this research sample, represented by Cronbach's Alpha, prove that all dimensions' reliability is 67.7%. In addition, the Internal Reliability of the different number-items scale is also assessed using the Cronbach's Alpha technique. The assessment indicated that the different numbers-item scale produced a Cronbach's Alpha in the range 0.800 to 1.00, indicating "Very Good" to "Excellent" reliability. This result proves that the selection of the questions is suitable for the questionnaire's purpose. Table 11 summarizes the overall reliability results reported as Cronbach's Alpha.

Table 11: Cronbach's Alpha: the overall reliability results for Dimension 1, Dimension 2, Dimension 3, Dimension 4, and all the Dimensions

	Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**No of Items**
Dimension 1	0.841	0.839	14
Dimension 2	0.494	0.910	19
Dimension 3	0.968	0.951	37
Dimension 4	0.960	0.957	28
All dimensions	0.677	0.974	98

IV. CONCLUSION

The SSSC KB CLOUD provides a novel approach for knowledge capture and sharing during the SSSC development process. In addition, it acts as a comprehensive management tool for the daily SSSC experts' works and tasks. It automates the SSSC framework processes by incorporating KM concepts into the SSSC developmental process to ensure effectiveness as a "collaboration tool". The SSSC KB CLOUD provides the SSSC participants with features to help them during the software's developmental process, including communication,

collaboration, knowledge sharing, transfer, and retention. The SSSC KB CLOUD was administered to a sample of 142 participants, including third-year students at three universities majoring in software development and software experts from the industry, working on software development projects for 3-4 months. The results demonstrated that the SSSC KB CLOUD had improved the students' speed, performance, efficiency, and productivity. Furthermore, the test also confirmed that the SSSC KB CLOUD had improved the overall speed, performance, efficiency, and productivity of the companies' SCs. The analysis of collected data demonstrated that the SSSC KB CLOUD adoption has improved and increased the experts/ participants' overall performance, productivity, speed, knowledge sharing, acquisition and transfer, communication, and overall awareness during the software development process.

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