Knowledge Management Systems in the Agricultural Context to Face Resilience in the New Normal

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Abstract— The COVID-19 pandemic has given a forceful full stop to all daily routines, while shutting downing workplaces, entertainments and meetings among others. Amidst the revolution of the Coronavirus, the active parts of the world are only the essential services such as health, food production and supply. The continuation of the pandemic has created a New Normal with lapses in the production lines evoking the value of cultivation and their need to engage in self-productions. Therefore, farmers and the public have attempted at taking steps to cultivate at their best as they do have to survive. Though the start-up was a success, issues arise with the continuation of their cultivation due to the lack of precise knowledge and experience. Primarily, the issue arises with the lack of know-how knowledge for cultivation. Therefore, this research provides a critical analysis of how knowledge management systems can support sustainable progress in cultivation. This paper attempts to define the meaning of knowledge management and knowledge management systems in national and international perspectives to guide the unguided public in critical New Normal conditions.

Keywords: knowledge management systems, knowledge management, agriculture and cultivation

I. INTRODUCTION

Knowledge management concepts and knowledge management systems are globally applied in many industries to secure the know-how and other knowledge and experiences for the future and to accomplish their goals faster and more effectively by delivering the right knowledge to the right person (Lwoga, 2009).

The paper targets analyzing the procedures to apply the knowledge management concepts on knowledge management systems to secure the prestigious art of Sri Lankan agriculture. It aims to highlight the benefits of securing agriculture knowledge and know-how through knowledge management systems to be used now and then in new normal or critical economic conditions to safeguard the life systems.

The Covid-19 pandemic has created a new normal where each life has been adopted to a silent growth with self- isolation, and the busy patterns of buying and consuming have been limited with the uplifted restrictions to the free movements. Many of the private sector entrepreneurs have been affected by this new pandemic normal. Therefore, many of the public has moved to the most demanded business in the new normal, cultivation, either to sell or to consume for their life survival. It is that the pandemic's new normal has created an increasing and enthusiastic pattern in public to engage in agricultural and cultivation activities knowing the value of it.

The attention to agriculture to ensure the needs of consumers at both the home basis and country basis has become an essential factor during the pandemic. It is that most of the Sri Lankans who had led busy life patterns with junk food patterns had to shift into home-prepared foods due to the shutdown of the country and with the existing limitations and movement restrictions to defeat the spread of COVID -19. Therefore, this shutdown of the country has created much time for the people to utilize that for agricultural purposes to produce foods for their daily consumptions. Though the people have enthusiastically engaged in agricultural purposes, sometimes the lack of knowledge and experience as of farmers with them may not give them the productive results of harvest as expected. Agriculture is a vast process that

extends with a lot of traditional ways, experiences, and with the practice of the farmers, they have on their hands and especially with the tacit and implicit knowledge that the traditional farmers are rich with. A man who cultivates intending to achieve financial benefits through cultivation to secure his life system in the new normal should at least have all the basic knowledge about all the prerequisites and the steps and conditions to follow with.

A. Research Problem

Though the trend has started to move towards the cultivation during the pandemic season, the lack of knowledge and the inability to acquire required knowledge from agricultural institutes and government agricultural departments with the prevailing pandemic's new normal conditions, the enthusiasts have moved a little backward, and many have become failed due to the lack of guidance, and lack of experiences and know-how.

In Sri Lanka, most of the government and semi-government websites are well rich with content regarding agricultural issues and anyone can acquire the theories and steps by reading those contents. But, if the prevailing systems are mostly content-based rather than providing know-how and indigenous knowledge or real-time or more practical solutions, the knowledge management and sharing may not be productive as it is only a set of words and steps with just a content management system than a knowledge management system that can accelerate people to do cultivation.

B. Aim

The research aims to analyze the options that could be taken to guide the unguided general public to engage in cultivation accurately with the use of knowledge management concepts and knowledge management systems to achieve sustainability in cultivation by any person who has or has not tacit and implicit knowledge even during such an arduous and shutdown period like, COVID - 19. Therefore, this paper aims to analyze the aforesaid concept to develop a knowledge management system embedded with both implicit and explicit knowledge suitable for the Sri Lankan context.

C. Objective

The objective of this paper is to identify the ways and means of utilizing the knowledge management concepts to develop knowledge management systems to provide knowledge service for the unknown. Secondly, the general public to make them achieve success through the acquisition of needed knowledge at the right time in cultivational targets during a new normal condition with an unending pandemic suffering where they cannot acquire knowledge through physical means and support. Furthermore, the objective is to secure tacit knowledge, implicit knowledge and precious experiences in a systematic and value-added manner to obtain and learn by any person who needs know-how about the farmers' secrets and proper guidance to the cultivation through virtual means that is accessible by any time of the period efficiently and effectively.

II. LITERATURE REVIEW

Many concepts and research ideas have been carried out by world researchers based on the application of knowledge management strategies to sustain agriculture utilizing knowledge management systems. Moreover, literature about how countries and certain villages have adopted the support of knowledge management systems to overcome certain types of critical situations is synthesized below.

According to the ideas of Soc et al (2003) the knowledge management approaches can harness isolated information, experiences, skills, and know-how for sustainable socio- economic development. Furthermore, in the same manner, systematic knowledge management methods and tools can apply to store and disseminate the valuable know-how and the experiences of farmers can make the unaware audiences engage in cultivation and agricultural activities in a better productive way. Thus, it enables to achieve an agriculturally sustainable country even in pandemic situations as the correct information is available for any and could be guided utilizing knowledge management tools.

Amarendra (2017) has reviewed that, "Knowledge management in agriculture is relatively a new idea. Knowledge management in agriculture requires a lot of ability building". Further, Arun Kumar et al (2014) have agreed and commented the same, "Knowledge Management in agriculture is relatively a new concept. The mammoth task of driving the knowledge sharing process in agriculture

requires a lot of capacity-building exercises." As quoted, that application of knowledge management tools to capture, store and share know-how needs a lot of effort. It is stated as "knowledge harvesting and sharing through a write shop process – Knowledge Management for Agricultural and Rural Development (KM4ARD)," n.d. has emphasized a model named, 'Knowledge Harvesting' which uses a variety of approaches like relating a story, interview, coaching, writing, and documenting to transform implicit knowledge into explicit knowledge easily so that information can disseminate to a large audience.

Amarendra (2017) has highlighted, even the agricultural organizations have realized the "importance of managing both explicit and implicit knowledge for the dissemination of knowledge as well as to fulfill the Ranganthan's conceptright information to the right user at the right time." Further, the paper emphasized that knowledge management is a keycomponent and as well a systematic discipline of policies, processes, and activities which lead an organization towards empowerment while optimizing effectiveness, innovation, and quality. As proposed by Amarendra (2017) to capture knowledge and embed those into knowledge management system need the participation of stakeholders who are related to agriculture through the "the attainment of efficient knowledge management in agriculture includes the farmers, farmer organizations, policymakers, extensionagent, and scientist.".

Moreover, Soulignac et al (2012) have also agreed and commented similarly that; "the development of a collaborative knowledge space relies on a capacity to appropriate the experience of others. The actors also have to share the same objectives." Further, Soulignac et al (2012) have highlighted that, to sustain agriculture, it needsvast knowledge because "it has a systemic logic and therefore requires a strong knowledge base." Therefore, forthat, they proposed to "develop a knowledge management IT-based system." As quoted by Soulignac et al (2012), "in sustainable agriculture, besides, the thematic knowledge appropriation of knowledge by the farmers is fundamental,"and according to the critical point of view, to achievemaximum productivity through agriculture, the implicit knowledge and expert experiences over the

years, within a farmer is an essential thing. Among the concept projects, Soulignac et al (2012) have proposed that an "Organization, Information, Decision, Knowledge" (OIDK) model dedicated to large-scale organic farming," where knowledge is integrated with subsystems to deliveragricultural knowledge as the output. The system manages the inflow of information about Fuel; weather data; organicfertilizer; state of the crops; the level of bio-aggressors, natural products, seeds. According to them, "the knowledgecapital is embedded in the system in the modes such as know-how, soft skills, and the other knowledge is feed intoinformation systems which includes the agents who informthe farmer. It comprises all the strategic and tactical information supplied by these actors, which become information consumed by the farmer. The information system also lists the information produced by the farm. Thisinformation is later utilized in decision-making (ACTA, 2007). Furthermore, Soulignac et al (2012) has discussed amodel named, MASK, Concept which is based onrecognizing the excellent skills of the chosen farmers classify knowledge according to the agricultural mechanization model for organic wheat production and thesystem intakes the way professional farmers reason and their soft skills and know-how as the system inputs.

Moreover, in the paper, Part (2010) also has assessed "applying knowledge management models in managing and integrating indigenous and exogenous knowledge for improved farming activities in Tanzania...". According to that, in Tanzania, mostly the explicit knowledge by researchers, laboratories and universities are preserved in information systems and make access by farmers through an intermediate person who has technical facilities. Also, it highlights the preserving of explicit knowledge of researchers and universities are not sufficient to sustain in agriculture as "farmers' knowledge has been responsible for improving agricultural productivity and ensuring food security for centuries in Tanzania." Therefore, the paper points out that "success in agricultural activities depends on the capability of farmers and agricultural information actors to leverage local knowledge and embody it with exogenous knowledge to produce value from these knowledge resources. Since Indigenous Knowledge is essential for agricultural

development, it must be managedand preserved in the same systematic way as external knowledge", as the knowledge and local practices that are preserved in people's minds may be eroded by failing memories and death or not held in the heads of a few. Further, the paper Part (2010) thoroughly emphasizes that Knowledge management practices can give a better solution for that by converting tacit knowledge into a more explicit form by enhancing tacit knowledge flow through human interaction. As well Lwoga, Ngulube, & Stilwell (2010) signify the "urgent need to acquire, document and preserve indigenousknowledge so that it can be available for agricultural developmental initiatives before much of it is completely lost."

Moreover, according to the rice knowledge management portal discussed by Arun Kumar et al (2014), the portal helps to share the knowledge and information regarding rice cultivation "context in the local languages to the ever "Information-Hungry" farmers." The system consists of a separate section for the farmers called "Farmers Domain" to place questions and then solutions are provided viaonline modes and through SMS. Furthermore, that portal isnot only built for the use of farmers but also other stakeholders such as extension professionals, researchers, traders, NGOs, policymakers, who can search and gather information related to rice farming. So, that information may not be limited to fewer.

Further, Zecca & Rastorgueva (2017) has emphasized that sustainability of knowledge management is the success for providing sufficient information is enabling to use of that knowledge to improve individual performance and to apply accurately in decision making. According to the viewpoints of Zecca & Rastorgueva (2017), "improving availability of information; enhancing a decision-making activity on different levels and providing relevant information for all production stages."

In addition, "knowledge harvesting and sharing through a write shop process – Knowledge Management for Agricultural and Rural Development (KM4ARD)," n.d. has discussed a system which was "developed by the International Institute of Rural Reconstruction (IIRR) during a workshop to produce a kit for

"Regenerative Agriculture Technology" in the Philippines. It is defined as"a participatory way of packaging knowledge over a short period." It helps document tacit "experiential" knowledge turning it to explicit, by making it understandable and thus,more easily usable."

Furthermore, the article, "knowledge sharing through social media creates a voice for Pacific farmers and smallholders – Knowledge Management for Agricultural and Rural Development (KM4ARD)," n.d. highlights the use of digital media to store and share farmers' problems to a common collaborative platform about their selling, product prices, tacit and know-how with the hashtags enabled tracking of conversations.

Further, "developing a taxonomy for agriculture and rural development – Knowledge Management for Agricultural and Rural Development (KM4ARD)," n.d. portrays the need for the knowledge generated from experience and a system of taxonomy where people can retrieve it easily as per their need.

Boateng (2006) signified the importance of mixing both implicit and explicit knowledge in equal portions to return productive decision making. According to Boateng (2006), "an effective knowledge management strategy for agricultural extension practice must aspire to bring the communities of extension experts and farmers together in all the knowledge management phases – from knowledge creation to utilization." Further, the author points out that roles and actual meaning of both tacit and explicit knowledge should be understandable to both communities and the concept of externalization through socialization is vital. It can be accelerated utilizing the model, "Nonaka and Takeuchi" which bridges the knowledge divide between the two communities, farmers and experts (Hoe, 2006).

Besides the aforesaid, according to Ngulube (2002) the inadequate management of information, most of the indigenous information accumulated by colonial district officers and early missionaries cannot be located in many archival institutions in Africa. Similarly, the inability and the failure to keep the knowledge management system to acquire hidden know-

how of rural farmers have made other general public far from achieving true harvest and

III. ANALYSIS

The analytical overview of the knowledge management systems that have been utilized globally to achieve proper knowledge sharing and management in the context of agriculture and cultivation are synthesized below. Further, few websites were utilized by the Sri Lankan government, i.e., www.goviya.lk, Govianna, www.agrimin.gov.lk, www.doa.gov.lk were analyzed to validate the knowledge management concepts within the existing systems in Sri Lankan agricultural sector (Baddegama, 2020).
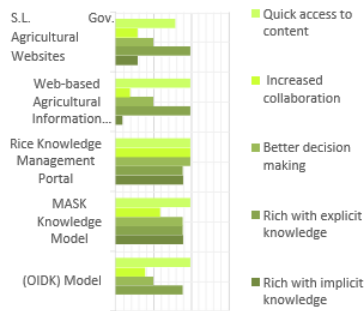
Figure 1: Analysis of Literature Summary

A web-based agricultural information system was proposed for Sri Lankan agricultural sector. This application provides content management through a web application and composed of explicit information, i.e., crops and inter-crops, their production and export details, crop and inter- crop diseases, land availability, soil suitability, fertilizers related to four major crop types, i.e., Rubber, Coconut, Tea and Rice (Fernando, 1998). The data inputs to the system are provided through institutes, namely: "Rubber Research Institute, Agalawatta; Tea Research Institute, Thalawakale. Further, it is highlighted that application will eliminate the barriers to agricultural information, which is rarer and may add more value to the information and may be benefited many researchers and other parties who are searching for agriculture-related information (Fernando, 1998).

IV. METHODOLOGY

A qualitative and qualitative approach was applied to critically analyze the applicability and the idea of utilizingknowledge management tools and concepts in the field of agriculture.

Initially, a comprehensive analysis of secondary data collected regarding knowledge management systems,concepts, and models presented globally in works of literature, i.e., international journals, publications, conference papers, government reports, and websites are observed and evaluated considering essentials for a tacit and explicit knowledge.

Secondly, interview sessions were organized with agricultural officers and authorities to clarify the prevailing perceptions and the systems in the Sri Lankan agricultural field and analyzed to evaluate the applicability and the need for implementing knowledge management tools to acquire store and share indigenous tacit knowledge and experiences of rural farmers, to make accessible by the public who are away from those.

The applicability, benefits, and limitations of knowledge management systems in the agricultural sector were evaluated and the analysis of that information collected through the interview sessions is emphasized below.

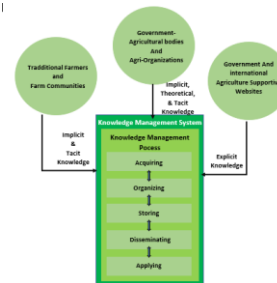Knowledge Management in the Field of Agriculture

Figure 2. Analysis Results

V. PROPOSED DESIGN

The proper knowledge management tools should be implemented to overcome the challenges that the public faces in the attempt to cultivate. Therefore, knowledge management systems could be plugged in as a means of guidance and knowledge providers to avoid the general public stepping backward for cultivation. A system can be designed to store and deliver the right information about traditional indigenous knowledge and farmers' experiences to use by any person who needsguidance and information in a quickly accessible way.

As the means of data input to the system, the data acquired from the development officers, "Govi-Jana Sewa" officers, farmers, field workers can be identified. Moreover, the data inputs can be done through the systems such as the E- farmer ERP (Pradeep.R.M.M, 2020), government websites; (SriLanKorDAA), (International Crop Research Institute for the Semi-Arid Tropics (ICRISAT)).

The system can store data about the traditional indigenous methods and knowledge applied in cultivation; knowledge about soil combination, land selection, an essential type of treatments and their measurements of application depending on the crop type, phases to follow to plant crops from seed selection till the watering and other general guidelines and practices of rural farmers, etc. So that the general public can search and acquire knowledge which they are lacks with depending on each of their need.Further, the system can be embedded with an online collaborative platform where users can place their queries into the system to get customized and practical answers in real-time.
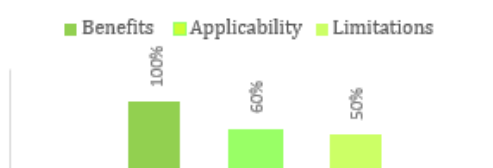

Figure 3. The Conceptual Design

VI. DISCUSSION

According to the information synthesized above concerning the literature analysis, the world has accepted the need for preserving indigenous knowledge and experiences of farmers they had for years. Further, the linking of both know-how of the farmers and the proved scientific methods of experts and other researchers could lead to sustainability through cultivation, especially during a pandemic period as social distancing has blocked the acquisition of knowledge in real-time interactions. Therefore, the systematic management of knowledge, utilizing knowledge management tools and concepts can enlighten and transform a person who does not know what farming is into a skilled farmer.

Mainly, during the pandemic new normal, where everyone is practicing social distancing, the people who are eager to enhance their farming and cultivation lands to become sustainable through that can be supported with the implementation of a knowledge management system. It is,the system will provide quick access to indigenous know- how of rural farmers for any searcher with just a single click.In addition, the shutdown of services rendering by agricultural offices and officers can be replaced by the implementation of a knowledge management system where the general public can place the queries and be afforded quick solutions through the system's embedded knowledge of explicit and implicit knowledge.

VII. CONCLUSION

This paper provides an analytical overview on the concept of developing a knowledge management system to store, disseminate and apply the tacit, explicit and implicit knowledge and experiences of rural farmers and explicit and theoretical knowledge of researchers and institutes to a one-stop accessible system, where the general public can acquire the knowledge, they need for today and the future.

The accurate knowledge management will ensure sustainability through cultivation as the knowledge will not be buried even the decades got over as the hidden tactics of know-how and the experiences of the ancestral farmers are still alive with the technology-enabled knowledge management systems and concepts.

In a new normal condition, where we all have learned the vitality of cultivation, knowledge management systems will stand against the information dissemination barriers and provide benefits for cultivation engagers.

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