PHD Thesis

Indigenous knowledge as Cultural Capital and Internal Migrations:

Opportunities and Constraints for Sustainable Agricultural Development in Bangladesh.

Submitted to

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Abstract

Indigenous knowledge has been a crucial component of social and economic growth in recent years, particularly at the local and rural levels. The local voice, priorities, and pledges to empower residents by taking control of the social process are therefore all included in the notion of indigenous knowledge. 'Indigenous knowledge' was lauded as a potential solution to the development deadlock towards the century's close, particularly after the development imperatives had lost much of their early promise. The multitude of criticalities presented undeniable proof that traditional development organizations and funding bodies have launched their initiatives with minimal regard for local perspectives and the wisdom of the community. Scholars and academics have recently fantasized about a "post-development" age when "indigenous" and communal knowledge might provide innovative alternatives to development (Esteva, 1988; Escobar, 1995; Rahnema, 1997; Sachs, 1992). Previously, traditional knowledge was regarded as a significant impediment to progress; however, contemporary researchers and policymakers assert that it may be crucial to dialogues on sustainable resource management and impartial development (Agrawal, 1995). The transformation of the global economic landscape exerts a direct influence on local or rural dynamics and community cohesion. The swift expansion of urbanization and the relentless impact of globalization have created a complex array of dimensions affecting local lives and livelihoods. Urban areas are increasingly emerging as a realm of potential for better livelihood and economic prospects, as well as a hub of enhanced opportunities. The phenomenon of liberalizing ideas and knowledge, goods and products, culture and communication, as well as human interactions and agencies, along with the global market and social institutions, demonstrates a pervasive influence that shapes our world. Migration driven by globalization, can significantly impact rural communities by eroding the social capital embodied in indigenous knowledge. The effects may counteract sustainable agriculture by promoting intensive farming, labor-saving production methods, extensive mechanization, and alternative land uses beyond food production. The research project explores the following line of reasoning: the impact of globalization, including export processing zones and the garment industry, on internal migration subsequently influences social capital and indigenous knowledge within rural areas. Therefore, chapter four explored the effects of globalization, represented by export processing zones and the garment industry, on internal migration, which in turn affects social capital and indigenous knowledge in rural areas. The results of the structural equation modelling indicate that migration intentions are

mainly influenced by subjective norms and, to a lesser extent, attitudes towards migration and perceived behavioural control.

The study presented an empirical contribution via a case study of a rural community in Bangladesh, illustrating the practical feasibility and importance of integrating Indigenous Knowledge (IK) with Scientific Knowledge (SK). It provided evidence for the application of IK through a knowledge management model (KM) to address local agricultural challenges while meeting broader sustainability goals, distinguishing it from research that is either theoretical or focused on generalized concepts. The findings suggest that local stakeholders in Bangladesh regard indigenous knowledge (IK) as a legitimate and technically viable approach, leading them to integrate it with scientific knowledge (SK) within a knowledge management (KM) framework. This observation differs from earlier studies that often highlight a resistance to or skepticism regarding IK among development professionals. The research highlights the cognitive and behavioral motivations of local stakeholders in engaging with Indigenous Knowledge, especially concerning ecological sustainability. Previous studies have often characterized IK as a passive element, assuming that communities would exclusively adopt SK-driven initiatives. This study challenges the notion, showing that stakeholders regard the environmental and cultural dimensions of Indigenous Knowledge as essential for achieving sustainability and ecological balance. This research supports that KM may facilitate the integration of IK and SK in a manner that is psychologically and culturally validating for local populations, hence fostering resilience and creativity within KM. By establishing IK as a fundamental component of KM rather than a supplementary one, the study sets a benchmark for future research to see IK-SK partnerships as a conventional strategy for sustainable development and KM. This integrated KM method addresses a significant deficiency in existing literature, demonstrating the symbiotic relationship between IK and scholarly knowledge (SK), hence promoting sustainability in alignment with both local and global requirements. This research supports policymaking by offering a practical, evidence-based framework for integrating Indigenous Knowledge (IK) and Scientific Knowledge (SK) into development plans, thus reshaping national and international policies to promote more inclusive and sustainable development. This study experimentally demonstrates the integration of Indigenous Knowledge (IK) with Scientific Knowledge (SK) by local communities to address agricultural and environmental challenges, highlighting the limitations of standardized, SK-focused approaches commonly employed in development projects. The research underscores the

necessity for national politicians to implement policies that recognize and institutionalize IK within KM, so establishing a basis for sustainable local practices that can enhance scientific advances. International organizations, especially those financing pro-development initiatives, are urged to contemplate locally integrated KM that utilizes IK, so creating policies that honor cultural contexts, improve community involvement, and advance information-sharing systems. This inclusive strategy might enhance the adaptability of development initiatives to regional demands, hence boosting their relevance and efficacy in undeveloped regions such as Bangladesh.

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Dedication

My family; the only nominee of the whole endeavor.

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Chapter One

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Chapter One

Introduction: Go Back to the Land

1. Background of Study

In recent years, the issue of indigenous knowledge has emerged as a key element of social and economic development, especially at the rural and community level. The concept of indigenous knowledge includes the local voice and priorities and promises of empowering locals through the ownership of the social process. By the end of the 20th century, 'indigenous knowledge' has been heralded as seemingly offering a way out of the development impasse, especially when the development imperatives had lost much of their initial promise. Over the past decades, conventional development approaches have experienced repeated failures, as they extensively focused on technological solutions and top-down 'package type' approaches. Nonetheless, more recent public policy tends to emphasize the necessity of "listen and learn from the people" (Thompson and Scoones, 1994) and to make local people active partners in the research and development process. The number of criticalities provided irrefutable evidence that conventional development institutions and donor agencies have initiated their development projects with little consideration of local voice and people's knowledge. How they think about their development, what kinds of indigenous intellectual property they have used to make decisions and mitigate the vulnerability, and what sort of local expertise and techniques they have practiced for their survival, have largely been ignored in the populist and West-led development model for decades. Moreover, the concept of development is multifaceted, its meaning continuously transforms at the local level, regional settings, and global arena are depending on the context. The western-oriented development in third world countries has been haunted by its ghost, 'underdevelopment' (Cowen and Shenton, 1996; Edelman, 1999). Recently, researchers and scholars imagined a "post-development" era in which community and "indigenous" knowledge become a reservoir of creative alternatives to development (Esteva, 1988; Escobar, 1995; Rahnema, 1997; Sachs, 1992). They have begun arguing that indigenous and local knowledge should constitute the core of development models in the third world (see, for example, Brokensha, Warren, and Werner 1980; Hobart 1993; Brush and Stabinsky 1996; Dudley 1993; Burkey 1993; Long and Long 1992). In contrast to the past, when traditional knowledge was typically seen as a possible obstacle to development, it is now claimed by scholars and policymakers that it might be pivotal to discussions on sustainable resource management and balanced development (Agrawal, 1995). In this

perspective, the present research aims to address two inter-related questions: first, how different rural actors acquire and use their knowledge for a good combination of knowledge and how this knowledge dynamics can contribute to building KM for agricultural sustainability. Second, reveal the constraints and obstacles (e.g. rural to urban migration induced by globalization) of this process of integration that prevents to build a viable KM model.

Knowledge is a strategic resource (Freeman, 2001). The process of organizing and leveraging knowledge embedded in people's experiences, competencies, talents, ideas, practices, intuitions, skills, wisdom, and capabilities, in addition to documented and codified sources, has been characterized as knowledge management. The central focus of knowledge management is sharing what people know (Todd, 1999: 11-14). Humans in society have practiced and shared this knowledge and experiences as pertaining to the natural environment and certain cultural settings. They have encountered challenges with acquiring knowledge and experiences from everyday interactions and transmit them through generations as 'cultural capital' (Bourdieu, 1986). This study will try to connect dynamic aspects of the locals' indigenous practices regarding agricultural production management, policy implementations, and decision-making process, whereas 'indigenous knowledge' is generally taken to refer to alternative, informal types of knowledge, including ethno-management, ethno-accounting, ethno-musicology, ethno-mathematics (Horsthemke, 2008). Odora Hoppers quoted in this regard that,

"Categories of this traditional knowledge include agricultural, meteorological, ecological, governance, social welfare, peacebuilding and conflict resolution, medicinal and pharmaceutical, legal and jurisprudential, music, architecture, sculpture, textile manufacture, metallurgy, and food technology. There is the cultural context surrounding the practice of this knowledge, including songs, rituals, dances, and fashion; it also includes technologies that range from garment weaving and design, medicinal knowledge …, food preservation and conservation, and agricultural practices … to fisheries, metallurgy, and astronomy. (Hoppers, 2005:3).

The potentials of indigenous knowledge in the further development of agricultural production systems and agro-management systems have recently been recognized (Sillito, 1998a). Central to this discussion is the consideration of the "knowledge" embedded in groups at whom development projects are aimed, rather than assuming and relying on the universal applicability and superiority of scientific knowledge (Escobar, 1995). Such approach offers a positive way forward because i)

it takes greater account of the specificities of local conditions; ii) it draws on the knowledge of a population who have lived experience of the environments in question: and iii) it provides people with control of the development process. Globalization has become a widely recognized concept for explaining the contemporary restructuring of the industrial, agricultural and service sectors of the economy, with the formation of, and access to, global markets for products and services commonly interpreted as dominant exogenous economic, driving forces 'in the restructuring of regional economies' (Amin & Thrift, 1995). As a global process of liberalizing ideas and knowledge, goods and products, culture and communication, human and agencies, global market and social institutions, globalization has its ubiquitous impact. Migration induced by globalization (but also by push factors such as natural disasters) can profoundly affect rural communities by undermining the social capital represented by indigenous knowledge. These effects can lead in the opposite direction to sustainable agriculture: intensive farming, labor-saving production techniques, heavy mechanization, and land use for other purposes than food production. Therefore, the research will also investigate the effect of globalization (e.g, export processing zones, garment industry, etc.) on internal migration which contributes to social capital loss and indigenous knowledge dispersion in rural areas.

2. Rationales of the Study

Bangladesh predominantly possesses a rural-based agricultural society from the very beginning of its history. Agriculture plays a vital role in its recent economic progress. After the independence in 1971, Bangladesh has gradually initiated the imported 'modern' technologies and introduced high-yielding seeds for mass food production, ignoring the local capacities and skills. Although the introduction of modern technologies and scientific knowledge in the agricultural sector has significantly changed food production in a numerical sense, the imperfect use of these technologies puts environmental sustainability at risk. Out of the total land surface, agricultural land is 65.3% and government forest land covers 15.19% (Ahmed, 1988), and most of the population is either directly or indirectly connected with agriculture. In such an agrarian society, farmers mostly rely on their experienced local knowledge. Traditional agriculture, as was originally applied, can never be fully resumed nor can it meet the food needs of the world's growing population. It is, however, useful to preserve and mobilize local knowledge, which reflects expertise in and understanding of the environmental aspects gained over thousands of years. In this backdrop, the study aims at

understanding the importance of such a farmer's knowledge and role in sustainable agricultural development in rural Bangladesh. The empirical section of this research focuses on the rural site named *Kakara*, situated in the southeastern part of Bangladesh, where the population is mainly an agricultural rural society. Most of the agricultural knowledge that is practiced here is traditionally embedded, locally applied, culturally distinctive, and ecologically determined knowledge transmitted from generation to generation. Such knowledge systems are collective, experienced, careful observational, and long experimental. It is a cultural property rooted in a social context (Johanson, 1992). Given this context, the study will establish how the indigenous knowledge becomes a 'cultural capital' (Bourdieu, 1986) for the balanced livelihoods of the local communities and how it can be a parallel resource with the modern scientific knowledge for sustainable development.

There is a limited number of studies on indigenous knowledge and its importance for sustainable agricultural development in Bangladesh. Agriculture is the main subsistence in nature for local food security in rural Bangladesh. Therefore, low-cost, labor-intensive and more profitable models for mass agricultural production are highly necessary. Nevertheless, the researcher also intends to consider the role of indigenous knowledge in modern agricultural development, which is commonly neglected by the development experts. This research represents a rather unique endeavour as it covers a number of pragmatic, academic and policy issues that may be of interest to scholars, academics and policymakers at national, regional and global levels. The aim is to unveil the potential of alternative development policies that maintain the conditions for sustainability. In this backdrop, the study could help to understand the importance of such farmers' knowledge and its role in sustainable agriculture. These custodians of indigenous knowledge and worldview practices play a very important role in agricultural development. This study aims to shed light on the existence of indigenous knowledge and its unexplored potential for development in Bangladesh, providing a newer dimension for the development of public policies and environmental studies towards sustainability.

3. Objectives of the Study

Research Problem

Research always begins with some problems or set of issues, from what Malinowski (2002) refers to as 'foreshadowed problems'[1] (Hammersley and Atkinson, 1997). Foreshadowed problems are guided by the set of research objectives that stimulate the whole research endeavor. The research design follows these problems of the study, generating a reflection on the relationship between the various variables considered and the object and context of the study. This research design leads to a better understanding of the social phenomena within the thematic background of the research topic. Taking these problems as the catalyst for the study, a number of steps were undertaken to achieve the research objectives.

Bangladesh is an agricultural country in the South Asian sub-continent. Agriculture is the main source for supplying the raw materials for the economic development[2] and majority of the population of Bangladesh either directly or indirectly depend on agriculture for their livelihood. Thus, agriculture becomes the mainstay of the rural economy of this country as well as the national economy. As this country is an agrarian country, people involved with agricultural production have relied upon indigenous knowledge for centuries for their production. Over the decades, various forms of indigenous knowledge have been utilised in agro-farming in Bangladesh. However, over the last two or three decades, farmers have become familiar with the use and benefits of modern technologies in agriculture. Although they are likely to be trained in modern technologies, they do not dismiss the use of indigenous knowledge for their agricultural production.

Indigenous Knowledge (IK) is an under-researched area. Universities and research institutes focus on the introduction of modern technologies rather than the study of IK. Consequently, individuals involved in agriculture are seen as inclined to follow 'modern agriculture' for better production in Bangladesh. (Rahman, 2012). However, it has been reported that the use of high levels of external inputs like agrochemicals, hybrid seed, fuel-based mechanization have significantly challenged the agro-ecosystem of Bangladesh (Rahman, 2012; Ahmed, 2000).

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[1] Malinowski, Bronislaw. 2002. *Argonauts of the Western Pacific: An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Quinea*, London: Routledge, pp. 1-20

[2] Agriculture sector contributes about 17% to the Gross Domestic Product of Bangladesh (Yearbook of Agricultural Statistics, 2014).
Source: http://www.bbs.gov.bd/WebTestApplication/userfiles/Image/LatestReports/Yearbook_2014.pdf

Due to the ever-increasing use of modern technology, much of the IK is lost during the past few decades. While most of the people are depending on agriculture in Bangladesh, it is important to ensure that they can continue the livelihood based on agriculture. However, in recent years, Bangladesh has experienced rapid extreme changes in climate resulting devastating loss in agriculture. Hence, it is timely that - to cope with the extreme natural disaster and keep ecological balance - using IK could be an influential strategy to sustain the agro-based economy. Accordingly, the study mainly aimed to explore a viable model of KM for integrating IK and SK to ensure agricultural sustainability as well as to reveal the constraints and obstacles hindering this process. The rural-urban migration induced by globalization and economic liberalization displaced the local labor force who engaged in agriculture. Industrialization, driven by globalization in urban centers, generates a pull force that attracts rural workers, whilst economic constraints in rural regions function as a push element (Todaro and Smith, 2015). Therefore, the study explores the dynamics of rural-urban migration caused by the globalization process that displaced local labor force from agriculture to non-agricultural sectors.

Research Question

The main objectives of the study are to examine the relevance of IK in the agricultural sector, as well as the conventional (scientific) knowledge, for ensuring sustainability. Therefore, this study considers knowledge management (KM) as a tool that could create opportunities for a proper integration of both forms of knowledge and contribute to an alternative development imperative. The study also readdresses several constraints, such as rural-urban migration that significantly affect local agricultural settings and lifestyles, thereby impeding productivity and jeopardizing sustainability. Finally, the study evaluates the stakeholders' intention to utilize the KM model as a cultural tool to engage the local people in development programs that promote agricultural sustainability in Bangladesh.

Specific Objectives

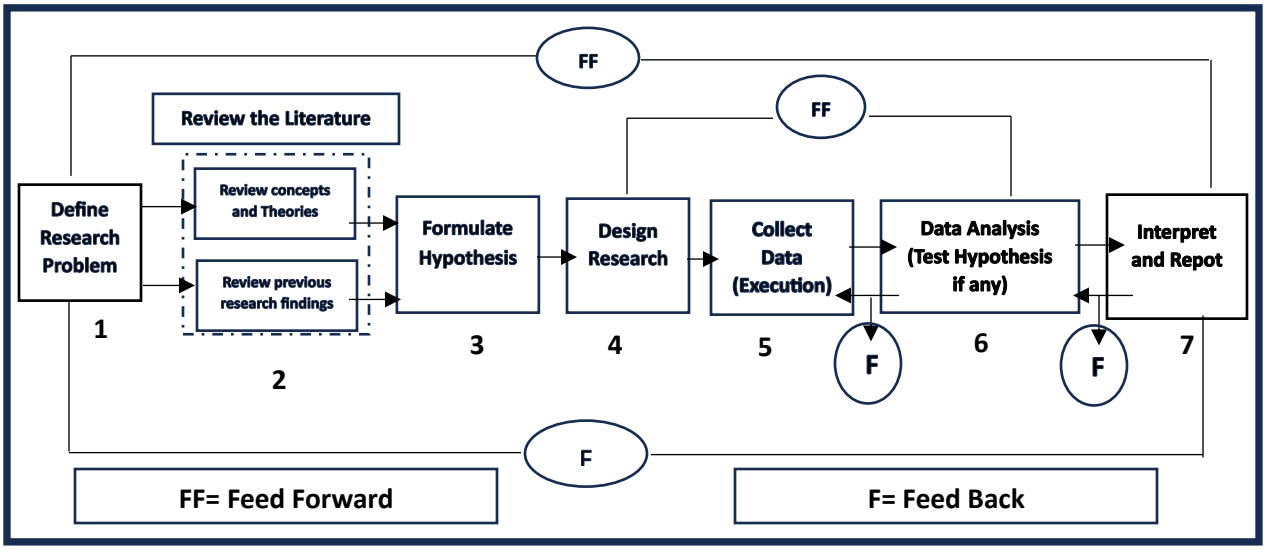
- To observe how indigenous knowledge can give their contribution within the existing modern models for balanced agricultural development in Bangladesh.
- To examine the applicability of this form of knowledge to mitigate the gaps between policies and actions of agricultural sustainability.

- To find an integrated model for knowledge sharing form both sources.
- To evaluate the influence of rural-urban migration rendered by globalization process that postulates multifarious impacts on local agricultural settings and livings.
- Finally, to evaluate the social and cultural values of indigenous knowledge and know-how as an alternative solution to the development dilemma.

4. Research Design

A research design provides a framework for the collection and analysis of data (Bryman, 2001). It has also provided a conceptual fabric for conducting research in pre-fieldwork preparation. According to Pelto (1970), "it involves combining the essential elements of investigation into an effective problem-solving sequence." This is the blueprint or road map that helps the researcher conceptualize how each step will follow the one before to build knowledge and understanding. A useful research design limits the scope of the endeavor, links theory to method, and guides the researcher. This study has adopted the qualitative approach as a philosophical orientation for combining the data obtained within the theoretical arena of social sciences. Research methods can be associated with different kinds of research design (Bryman, 2001). This research work follows mixed-methods research design combining qualitative (interview method) and quantitative (survey method) approach to leverage the strength of both. Therefore, this research was guided by the convergent parallel design where data are collected and analyzed simultaneously but independently (Creswell and Plano Clark, 2018). Before embarking on the details of research methodology and techniques, it seems appropriate to present a brief overview of the process of research which is indicated clearly in a research design. A process of research consists of a series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps (Kothari, 2004). The chart shown in Figure 1 well illustrates the process of a research design. The chart indicates that the research process consists of numerous closely related activities, as shown through 1 to 7. But such activities overlap continuously rather than following a strictly prescribed sequence. At times, the first step determines the nature of the last step to be undertaken. If subsequent procedures have not been considered in the early stages, serious difficulties may arise which may even prevent the completion of the study.

Figure 1. Process of Research Design in flow chart



5. Methodology

Research methodology is a way to systematically solve the research problem which has been used in this research and to take into consideration how one can overcome the limitations of suitable techniques aimed at capturing the real essence of IK. It may be understood as a science of studying how research is done scientifically (Kothari, 2004). Considering the research problem, objectives and study design, this research decided to apply a mixed method combining qualitative and quantitative techniques selected for understanding the specific context observed.

In particular, this thesis is the outcome of six months intensive fieldwork in the research area of *Kakara*[3] village in *Chakakria Upajila*[4] at Cox's bazaar district. In substance, the research questions and the content of the study match this research site. Most of the populations (80%) of the village are directly and almost all are indirectly dependent on agriculture. Although, most of the villagers have migrated to urban areas to get better opportunities of education, job and better life (I also took the opportunity), they still have deep roots embedded into the village. Consequently, the study

[3] A Bangladeshi village at Cox's bazaar district.
[4] *Upazila* denotes sub-district that formerly called *thana* (police station) is a geographical region in Bangladesh used for administrative or other purposes. They function as sub-units of districts. Their functionality can be seen to be analogous to that of a county or a borough of Western countries.

comprehended the 'emic' (Kottak, 2006) approach: the role of the 'native point view', when considering the participation in the local knowledge practices in agricultural farming (Malinowski, 1922). In order to dive deeper into the context of IK - which has been used through generations in the farmer's community for enhancing productivity, conserving ecological balance and natural recourse management -, I retained a constant engagement with various degrees of participation for a close observation of the lived experience. In lieu of emphasizing 'descriptive details' (Marcus and Fischer 1986, p. 18), the study has adopted the 'interpretative' approach, and the aim behind the approach were to attain 'thick description' (Geertz, 1973), with elucidation of the different strata of meaning appended to the various issues of socio-cultural and political-economic impact on local beliefs and practices concerning rural agricultural trends.

The study started with the allocation of the sample according to the geographical size and population density of the research area. Random sampling has been adopted, because the role of both male and female is relatively equal in practicing indigenous knowledge in terms of rural agricultural development in Bangladesh and sharing agricultural indigenous techniques that transmit into the generation. Despite having the idea of how indigenous knowledge is applied and the dynamics of changing agricultural patterns across generations, the study rejected the sample in proportion to age and sex.

The genuine part of the information was collected by using fieldwork with reliable survey methods. Apart from this, different PRA (Participatory Rural Appraisal) methods have been used to gather knowledge according to the problems faced. PRA is intended to enable local communities to conduct their own analysis and to plan and act (Chambers, 1994). This approach helped the researcher by providing useful tools for collecting information from farmers. It has enabled the researcher to keep close observation, maintained negotiation with individual and community. The key informants' methods have been used in different circumstances of the events for assessing data and accessing the local meaning of the cultural behavior of the community. Some methodological techniques have been used for analyzing data and arranging information in sequence: content analysis for triangulating information by using the text and seeking key events recorded in related documents, newspapers, magazines, books, articles and web sites (Fetterman, 2010), maps, flowcharts and organizational charts for justifying the qualitative observation in the field of indigenous knowledge based agricultural development.

Data were collected through an *ad hoc* designed questionnaire. All measuring components have been developed from the Theory of Planned Behaviour (TPB) model to measure the aforementioned variables within the context of the research (Francis et al., 2004). The primary part of the questionnaire was measured by nominal and numerical scale. Hence, the main part of the questionnaire set up with a five-point Likert scale, stretching from strongly disagree (1) to strongly agree (5), thus ameliorating the statistical problem of severe skewness (Fornell, 1992). Collected data were elaborated by means of the Partial least-square structural equation method (PLS-SEM) which is well suited in presence of small sample sizes and few statistical parameters (Chin, 1998; Das et al., 2021; Hair et al., 2011). The analysis was conducted by using SMARTPLS 4.0 software. The measurement attempted to analyse the consistency and weight of the variables (Henseler et al., 2009). The reliability was measured through both the Cronbach's alpha and the composite reliability (Alyoubi et al., 2018), whereas validity through the convergent validity and discriminant validity. The latter was verified by applying the Fornell-Larcker standards. In addition, to establish the significance of the proposed research hypotheses for a path model, the bootstrapping method was applied to merge an arbitrary re-sample of the primary data set for the elaboration of new samples of the identical sizes like the present data arrays (Chin, 1998). In this context, the homogenised path (β-value) and ρ-values were resolute to assess their weight. Finally, the structural relationships were examined by operating nonparametric bootstrapping (Sanchez, et at., 2021, Karani, et al., 2021).

6. Chapter Arrangements

The remainder of this thesis is as follows. Chapter Two includes a thorough literature assessment on knowledge management for merging IK with scientific knowledge. This chapter aims to identify gaps in the current literature, categorize research, and deliver a thorough review of knowledge management concerning indigenous and scientific knowledge within the framework of agricultural sustainability in rural regions. The study examined a total of 58 articles from the Scopus Database and manual searches about the KM model in relation to the integration of indigenous and scientific knowledge for agricultural sustainability. This chapter ultimately presents prospects and offers recommendations for additional study in this domain. The Chapter Three examines the evolving economy and society of Bangladesh, with particular emphasis on the desire to utilize knowledge management as a mechanism for promoting agricultural sustainability

in rural regions. This chapter aims to evaluate the integration of knowledge between science, representing global knowledge, and society, representing local indigenous knowledge. Therefore, this part suggests a cohesive mixture of both knowledge systems for assuring sustainability. This section assesses the goal of knowledge integration and the requirement for an effective knowledge management model within the agricultural supply chain, framed by the Theory of Planned Behavior (TPB). This chapter's empirical research examines a unique dataset created from ad hoc surveys administered to farmers and their suppliers in rural Bangladesh. The Chapter Four aims to comprehend the migratory intentions of rural individuals in relation to the explanatory factors associated with the growing urbanization in Bangladesh. The focus on urban-centric development strategies has positioned cities as hubs of trade and industries, generating significant job and livelihood prospects in metropolitan regions. The rapid transitions between rural and urban regions have produced several social-psychological elements that affect rural individuals' intentions to relocate to cities for improved employment, lifestyle, and amenities. Consequently, the primary aims of this chapter are to elucidate the social and psychological elements that drive rural individuals to move. This study utilized the TPB model as a conceptual framework to analyze the determinants of migration intention, focusing on the behavioral and psychological aspects influencing these intentions. This research - by employing the Theory of Planned Behavior - enhances the current literature on migration studies in Bangladesh with a novel empirical perspective. Chapter Five contains the overall discussions and reflections of the thesis.

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Chapter Two

Knowledge Management for Integrating Indigenous and Scientific Knowledge: A Literature Review on Agricultural Knowledge Management.

1. Introduction
2. Methodology
3. Content of the Study
4. Discussion of the Findings
   - 4.1. Discussion among Knowledge Agents
   - 4.2. Dimensions of Agricultural Knowledge
   - 4.3. KM Applications in Agricultural Context
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Knowledge Management for Integrating Indigenous and Scientific Knowledge: A Literature Review on Agricultural Knowledge Management

Abstract:

The purpose of this chapter is to fill a gap in the existing literature, classify research, and provide a comprehensive overview of the knowledge management between indigenous and scientific knowledge in the context of agricultural sustainability in rural areas. Therefore, with the global economic expansion, shaped by scientific advancements, Bangladesh needs a potential knowledge management method that can incorporate indigenous and scientific knowledge for ensuring sustainability. However, a thorough evaluation of the literature revealed that research on knowledge management regarding agricultural sustainability is few, disorganized, and mostly interdisciplinary. Thus, this research highlighted a small number of key studies in the field of knowledge management from mainstream publications along with several agricultural-related research on the potentials of indigenous knowledge and scientific knowledge. Therefore, the study reviewed in-total 58 publications from the Scopus Database and also manual search related to the knowledge management model in terms of indigenous and scientific knowledge integration regarding agricultural sustainability. Finally, this section of the research will unfold some opportunity and provide some recommendations for further research in this area.

Keywords: Knowledge Management, Knowledge Integration, Indigenous Knowledge, Scientific Knowledge, and Agriculture.

1. Introduction:

The rapid progressions in the field of information and communications technologies have significant implications for many sectors of society, extending beyond developed nations to include emerging ones as well (Islam, 2010). In this regard, several scholars (Sillitoe et al., 2009; Briggs et al., 2004; and Islam, 2012) argued that the process of marginalization has occurred as a result of the modernization of agricultural technologies. Migration, social unrest, an ill and unproductive labor force, and mismanagement or misuse of natural resources are among potential outcomes that might result from poor and low-productivity agriculture. Research findings from agricultural research institutions and other forums sometimes lack the necessary academic depth to provide guidance and befitted model to an intermediate institution. Initiatives that establish or strengthen collaborations between intermediary organizations and agricultural research institutions struggle to generate easily understandable content in local languages and at a suitable technical level, which will effectively meet the majority of community content requirements (Dutrenit et al; 2012). However, the success of these initiatives relies on intermediary organizations assuming the primary role as partners, managers, and evaluators in the process (e.g.: Kilby, 2010). The information that agricultural specialists acquired is developed in formal educational contexts (such as schools, universities, and research institutes), and it is then disseminated through the global network of professionals, institutions, and publications around the world called "global, formal knowledge system" (Raudeliuniene et al., 2022). More often than not, farmers have limited formal schooling. They learn via experience, trial and error, and the conventional habit of doing things. A social and cultural group that they are a part of is the source of their knowledge and education. A local, traditional knowledge system is one that constitutes farmer's knowledge. Thus, indigenous knowledge system is the body of knowledge that farmers possess if they are members of an indigenous community. Knowledge systems that are local or indigenous are intricate and deeply rooted in historical and customary activities (such as agricultural and curative methods). According to Odora Hoppers the notion of indigenous knowledge system has been defined as –

> "……the sum total of the knowledges and skills which people in a particular geographic area possess, and which enables them to get the most out of their environment …Traditional knowledge is the totality of all knowledge and practices, whether explicit or implicit, used in the management of socio-economic, spiritual and ecological facets of

life. In that sense, many aspects of it can be contrasted with 'cosmopolitan knowledge' that is culturally anchored in Western cosmology, sciences discoveries, economic preferences and philosophy (2005:02)."

This study aims to review the core literature on knowledge management (KM) for agricultural sustainability, as well as its specific applications, in order to fill the literature gap regarding a comprehensive KM model contributing to the advancement of productive, equitable, and sustainable agriculture. The Agricultural Knowledge Management System (AKMS) is the fundamental framework that encompasses many organizations, sources of information, means of communication, and behaviors associated with an agricultural process. Therefore, with the expansion of the knowledge economy, knowledge is considered as the most vital resource for organizations (Baum et al., 2000; Dyer and Nobeoka, 2000; and Gupta and Govindarajan, 2000). It includes information, comprehension, insights, and other forms of evidence that humans have acquired via learning and cognitive processes (Fait et al., 2019). Throughout the year, farmers make important decisions such as applying for credit, selecting crops, determining tillage methods, controlling pests, harvesting, post-processing, and marketing. In this process, a typical household relies on their own accumulated experience and the assistance of local organizations such as producer associations, input suppliers, rural credit agencies, extension services, NGOs, and schools. The home is also exposed to radio and television transmissions from sources that are located at a greater distance. Collectively, they constitute the indigenous knowledge system that is available to a small-scale farmer (Ubisi et al; 2019). The concept of the localized knowledge system pertains to information sources that are readily available to a farming family and often include a comprehension of the farmer's particular circumstances and requirements via recurrent and frequently mutually beneficial interactions. Frequently, farmers exhibit a greater level of confidence towards the institutions within their local AKS compared to their interactions with more remote entities, such as national ministries or worldwide organizations.

Several global issues, including food insecurity, poverty, climate change, sustainability, and environmental degradation, are being addressed by the agricultural sector. It is consequently impossible to minimize the significance of being able to use agricultural knowledge. Despite the remarkable success that the area of KM has achieved and the fact that it is still developing, it is not obvious to contemplate applying KM to important sectors such as agriculture. According to the analysis of the relevant literature, research on agricultural knowledge management (AKM) is

inadequate, fragmented, and extremely multidisciplinary. We have identified a limited number of 'Primary' AKM studies from mainstream KM journals and secondary' AKM studies from non-KM publications that investigate various parts of agriculture-related research. In light of this, this study is in line with Bandara et al. (2011), who argued that when a field is new and developing, researchers may also need to review secondary papers that do not specifically discuss the topic of interest, but they do include some discussion of it embedded within other different topics. The purpose of this paper is therefore threefold: 1) to analyze the contrasting approaches to AKM empirical research between scholars from mainstream KM journals (primary literature) and scholars from non-KM journals (secondary literature); 2) to examine the implications of these two research streams in terms of research and practice; and 3) to recommend a possible research direction for AKM scholars. The structure of the paper follows. In Section 2, the methodology is presented; in Section 3, the results are described; in Section 4, the findings are discussed and further streams for research are suggested; Section 5 offers managerial and policy recommendations.

2. Methodology

The main objectives of this review are to assess how KM can help to combine indigenous and scientific knowledge for ensuring agricultural sustainability. For this purpose, we initiated an organized exam of the contributions on the subjects pertinent to the current research, namely a systematic literature review in order to assure both transparency and rigor (Thomé et al., 2016). Generally, two sets of searches were made for the intended literature. The study considers top-ranked social science, arts and humanities journals listed in the most recent journal citation report issued by Scopus Database, an additional search looked for articles especially on the KM regarding agricultural sustainability manually.

In the first search we initially selected (knowledge* AND management* AND agriculture* AND sustainability*) 77 published articles from Scopus Database that had been subject to peer review; again, this number was further reduced to 36 according to the objective of this paper. Then, the following four inclusion criteria were applied: (a) relevant to the agricultural context; (b) empirical in nature; (c) written in English; and (d) accessibility. An additional manual search was performed on 'Academic Google Search', a database encompassing over 300 peer-reviewed journals published across

various disciplines. After eliminating duplicates, the number of potentially relevant documents returned by this search was reduced to 60. Following the application of the four inclusion criteria, a total of 22 papers from journals were identified as pertinent for the systematic literature review. Finally, we have selected 58 publications from 2000 to 2023 for this literature review.

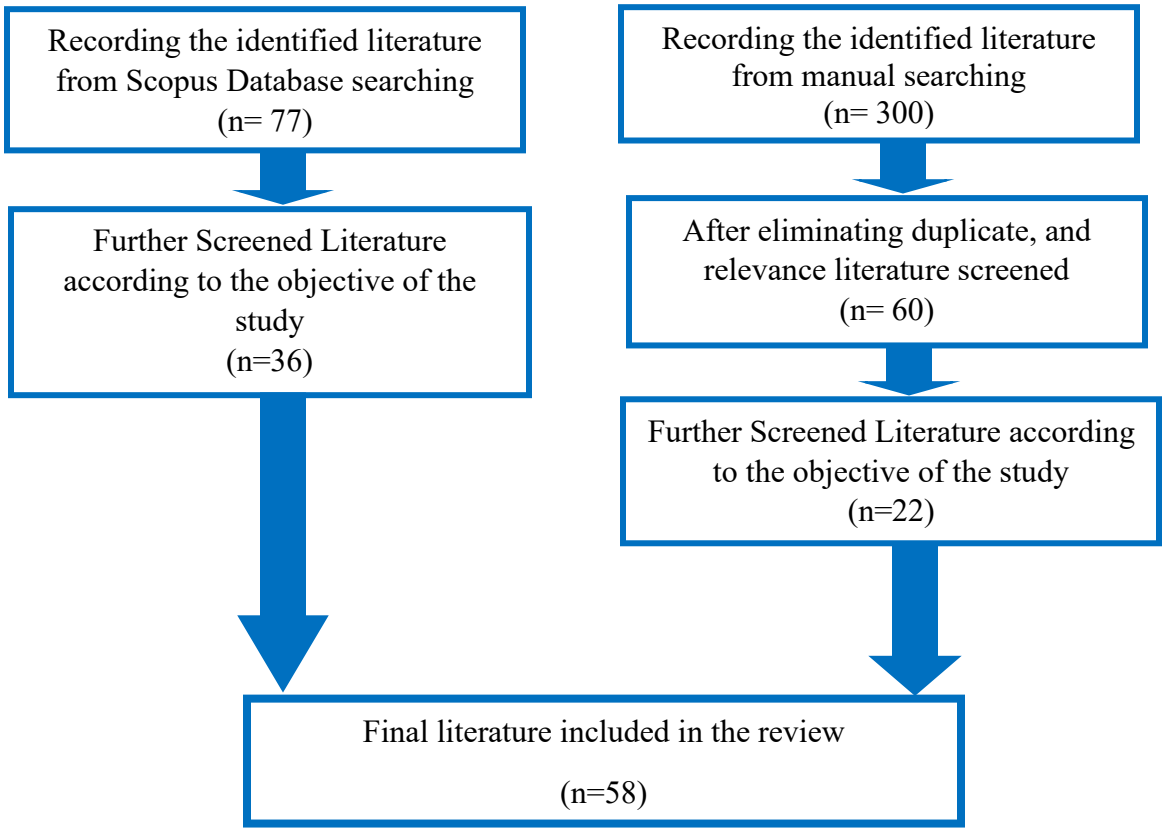


Figure 1. Flow of the research process

3. The Content of the Study

The purpose of this systematic literature review was to investigate 58 research papers, of which 14 were published in KM journals and 44 in non-KM journals (secondary research) that related to agriculture. One of the most popular publishing channels for knowledge management journal articles was the *Journal of Knowledge Management*, which published seven papers, followed by *Knowledge Management Research and Practice*, which published four papers. The remaining

studies were published in four other journals. In 44 non-KM publications, which were published in 27 different journals, there was a greater distribution of journals than in KM articles. The predominant pattern was the publishing of KM and Agriculture in each journal. Both impact factors and citation scores were considered for the evaluation of the quality of the publications. The quality of the knowledge management journals was almost twice as high as the quality of the non-knowledge management journals.

The Agricultural Knowledge Management (AKM) articles published in KM journals primarily addressed how to use knowledge for business growth, competitive advantage, and organizational improvement. The earlier articles, however, focused on agricultural organizations and agri-business ventures. Ten of the fourteen studies on mainstream KM journals were carried out in formal organizational settings (Chisita & Fombad 2020; Garciadeazabal et al., 2021; Ahmed & Newton, 2005); in inter-organizational settings (Fait et al. 2019; Garcia Villaverde et al. 2008; O'Connor & Kelly 2007); or in institutional settings that resembled formal organizations, like cooperatives (Galindo 2007), networks (De Bernardi et al. 2021), and projects (Feng et al. 2009). The operational context in these types of structured organizational study enabled managers and leaders to pinpoint places where knowledge processes may be applied, as well as tools and strategies that might be used to support the application of knowledge, whether on purpose or accidentally. Researchers were able to reach respondents more easily because of the organizational settings. Only two studies published in reputable KM publications (Torres et al., 2020; Mahindarathne & Min, 2019) took into account study participants in non-organizational contexts. These investigations used individual farmers who were not affiliated with any organizations and were carried out in agricultural communities.

On the other hand, researchers who published their findings in non-KM journals performed the majority of their AKM research in non-organizational settings, encouraging rural agricultural groups and people to participate in the study. In the assessment of secondary research, 29 out of 44 were carried out in community settings, with the majority of the studies concentrating on farmers. An acknowledgment of the indigenous wisdom held by farmers was an important part of these investigations. According to the findings of these studies, farmers have a profound and extensive understanding of numerous aspects of agriculture, including but not limited to environmental conservation (Jiao et al. 2011; Mamun, 2010), sustainable natural resource

management (Heijting et al. 2011; Wyckhuys & O'Neil 2007), pest management (Yemataw et al. 2016; Eisenberg et al. 2009; Guimarães and Mourão 2006), soil (Asse´ and Lassoie 2011), fertilizers (Misiko et al. 2010), and plants (Thorn et al. 2020). This literature review indicates that mainstream knowledge management scholars, whose focus is on formal agriculture organizational and agribusiness settings, overlook indigenous knowledge that is held by farmers and in community settings rather than in organizational settings. This is because the knowledge processes in these settings are facilitated by organizational managers and leaders, who may not appreciate the role, authenticity, and value of indigenous knowledge. Members of communities that operate in less formal situations have the opportunity to participate in a variety of knowledge processes without the need for formal or organized facilitation. Only three of the forty-four secondary investigations were carried out in structured or organized environments (i.e., Imam et al. 2021; Lopez et al. 2021; Powell 2017).

A particular non-KM study (Barua and Rahman 2018) distinguished itself by acknowledging that the agricultural sector consists of heterogeneous stakeholder groups that are embedded in both non-organizational and organizational settings. They interviewed Non Governative Organizations' (NGO) staff, researchers, private business owners, government officials, and resource users in addition to using a Participatory Rural Appraisal approach to look at the viewpoints of the fishermen and farmers in their area. This study included research participants from non-organizational settings such as fishermen, farmers, and local communities, as well as participants from organizational contexts such as NGO workers, private enterprises, government officials, and researchers. In particular, Barua and Rahman (2018) studied how indigenous knowledge techniques in Bangladesh are used to manage natural resources, assess economic worth of ecosystem services, and analyze use trends. They suggested that strong environmental protection measures may sustain environmentally friendly traditional values. Therefore, communities are seen as significant resource users with rich indigenous knowledge. They also prioritized engaging organizational stakeholders above farmers and local communities due to their significant role in encouraging resource usage in communities. However, commercial sector companies, NGOs, and government entities all play crucial roles in promoting ecological and economic advantages from resource use.

4. Discussion of the findings

The research on knowledge management (KM) that is now being conducted is predominantly focused on organizations that are mainly intended for profit maximization. In light of this, knowledge management researchers' approach to AKM research has focused on an organizational environment comparable to that of current KM studies. At present, knowledge management (KM) has been effectively used in organizations to improve decision making (O'íonnor & Kelly 2017), competitive advantage (García-Villaverde et al., 2018), innovation (Gardeazabal et al., 2021), and production (Torres et al. 2021). A significant amount of thought has been put into the use of KM in the public sector, notably the work of Massaro et al. (2015), who provides a useful assessment of the literature for the purpose of applying KM in that setting. Within the context of the application of management concepts, Boyne (2002) contends that public and private sector organizations are distinct from one another and call for distinct methods. In this essay, we build upon this argument by putting up the idea that the agricultural sector also has distinctive characteristics. For this reason, the application of KM to any industry needs to start with a thorough study of the sector to determine whether or not the existing KM principles are suitable for the sector, or else, a review and adaptation of KM principles to the context of the sector. Therefore, the purpose of this research is to argue that there is an increasing need for knowledge management experts to go outside the settings of organizations, particularly when they are investigating the agricultural sector.

There are three distinct areas of the agricultural sector that distinguish it from not just commercial organizations but also other public sectors. These areas include the arguments among knowledge agents, dimensions of agriculture knowledge, and KM application in agricultural context and knowledge integration. These three categories were found by a thorough literature review.

4.1. Interactions Among the Knowledge Agents

Agricultural knowledge actors were identified as farmers, local communities, farmer associations, local governments, national governments, technical agriculture experts, researchers, international development organizations, national/local NGOs, education institutions, and private sector agro-enterprises. This was determined based on the previous literature that was reviewed. These knowledge actors have distinct knowledge, expertise, motives, and objectives along with stems that span many epistemic boundaries. This is because of the different roles that they play. Even

when the work of these various knowledge actors appears to be interdependent, researchers in the field of agriculture (Sumane et al. 2018; Lwoga et al. 2013) have acknowledged that the various groups of agriculture knowledge actors are largely disconnected from one another. This disconnection primarily arises from strained relationships or conflicting perspectives and goals, but some of these groups may also hold knowledge that is mutually supportive.

The rapid advancement of technologies reconfigured the concept of communication practice among the knowledge communities, which is an emergent form of individuals' multiple interactive social spaces. These interactive social spaces of individuals can relate to ideas, values, products and stories that revolve around the social communication network of people (Raza et al., 2007). However, a number of scholars (Howell, 2002; Kempny, 2002; Amit, 2002) argue that these social interactions among the members of knowledge communities combine in an 'agency relationship' (Starbird, 2001; Zu & Kaynak, 2012). This exists in a border social space where they negotiate a portion of their cultural identity, while also surpassing the limitations of their social space-time and incorporating elements of the broader human identity.

4.2. Dimensions of Agricultural Knowledge

In their research, Mokhtari et al. (2005) interpret the concept of knowledge as commonly understood by individuals, as inherently more intricate than that of facts and information. They further stress that knowledge is generated by a highly powerful cognitive system known as the "human brain," which surpasses the capabilities of the most sophisticated supercomputers (2005). There are a multitude of perspectives about the true source of knowledge. According to Sveiby (2001), knowledge is generated solely within the human brain and is converted into information when it is expressed. Accordingly, Natarajan (2000) argues that knowledge that exists within the human mind is referred to as tacit knowledge, and when it is expressed in any form, it is known as explicit knowledge. On the other hand, Nonaka et al. (2003) stressed that the straight definition of knowledge as "justified true belief, as is done in the traditional Western epistemology", should be abandoned because it presents us with "an absolute, static and non-humanistic dimensions of knowledge (cited in Raza et al., 2007:48). Then, Nonaka et al. (2003) proposed that we should consider knowledge as dynamic because it is created in diverse social interactions within certain time and space. Siebers (2003) seminal fieldwork in a Guatemala village has recorded a significant

pattern of social interaction existing between local communities and the representatives of farmers. His work also revealed that farmers representatives perceive their cultural interaction with the local communities in a hierarchical fashion, placing the Western policy at the top. On the other hand, the local communities integrate modern agricultural knowledge with their indigenous agricultural knowledge (2003:37-38).

There is a diversified and heterogeneous information base because of the variety of the known players. It is well accepted in the knowledge management literature (Rodan 2002; Rodan & Galunic 2004; Nielsen 2002) that heterogeneous information has a number of advantages; yet, it also has the potential to be disruptive, which will need researchers to give careful study to the matter. The indigenous knowledge of farmers is often overlooked by policy officials and other players in the agricultural sector. These individuals dismiss it as ineffective, out of date, or solely based on mysticism (Lopez et al. 2021; Mashavave et al. 2013). According to Kamarudin et al. (2015), on the other hand, farmers have often rejected the customary wisdom that has been given to them via government extension institutions (Nain et al. 2018). Agriculture researchers have expressed their dissatisfaction with the lack of attention and implementation of their results by farmers and other actors in the agriculture industry. In the information age, technical experts like veterinarians continue to face marginalization from farmers and other players in the agricultural industry. This is due to the fact that they have a tendency to lose their monopoly over knowledge (Ruston et al. 2016), and their knowledge frequently comes into conflict with the indigenous knowledge that farmers possess (Kamurudin et al. 2015). Alternatively, the focus of government interventions and the knowledge that results from these interventions is typically on the commercialization and profitability of agriculture. On the other hand, the typical smallholder farmer is interested in farming as a means of subsistence and as a source of food security (Anderson, Learch, and Gardner 2016). Because of these instances, it is clear that the diverse information that is available in the agricultural sector could not always result in favorable situations, where academics often do not adequately frame knowledge management (Mtega and Ngoepe, 2019). AKM scholars should avoid applying existing knowledge management tools and techniques to the agriculture sector without conducting a critical analysis of the sector and its knowledge actors. Instead, they should conduct an analysis of the sector and its knowledge actors before developing agricultural sector's specific tools and techniques for dealing with

heterogeneous agriculture knowledge (Wang, 2018). This is because existing knowledge research already provides tools and techniques for dealing with heterogeneous knowledge.

4.3. KM Application in Agricultural Context

The information generated and applied in the agricultural sectors may be classified into two distinct categories: scientific knowledge (SK) and indigenous knowledge (IK). SK includes all methods and practices driven by theoretical models and governed by testing of hypothesis and experimentation (Tripathi et al., 2004) while IK is store of experience applied by local people passed over generations through trial and error locally with long histories of close interaction with the natural environment across cultures and geographic areas (World Bank, 2005; Lanzano, 2013). IK was utilized globally to facilitate decisions in agriculture, art and craft; communication and entertainment; medicine and healing practices; and other crucial socioeconomic areas (Sarkhel, 2016; Lanzano, 2013). However, much of the IK hardly is investigated yet and remains invisible; in turn there is a dire threat to the annihilation of IK (Masinde, 2013; Sarkhel, 2016). Thus, urgent actions are needed for systematic documentation and implementation of KM, as KM facilitates the practice of knowledge from previous experiences of decision making to present and future decision-making activities with the exact purpose of improving the organizations' efficiency (Jennex, 2005). According to King (2009), KM functions in an organization to operate KM process (i.e., knowledge creation, storage, sharing and application), and develop methodologies and systems to motivate people to participate within the process. In this regard, Jennex & Olfman (2001), and Arisha et al., (2013) suggested that KM initiative must be executed through knowledge management system (KMS) for the better effectiveness of the organizational functions whereas KMS provides such an information system (IS) that enables efficient managerial, technical, social and organization ambiance for effective KM. Saade et al., (2011) and Jung et al., (2007) proposed three basic subsystems of KMS: the people subsystem, the resource subsystem and the technological subsystem.

Social Groups	Roles
Agricultural Researchers	▪ Scientific knowledge systems creation, recreation, and presentation

	▪ Use indigenous knowledge from local farmers for further research. ▪ Interact with extension agents ▪ Evaluate the ongoing implementation of new knowledge and technology
Local Farmers	▪ Indigenous knowledge creation, reaction and presentation ▪ Use scientific knowledge and technology from research ▪ Interact with extension agents and researchers
Extension agents as knowledge brokers	▪ Extension agents exchange knowledge between farmers and researchers

Table 1. The roles of relevant social groups in KMS development.

Knowledge management is a framework that encompasses operational processes, local and transcultural expertise, and know-how that are essential for problem-solving, ranging from the individual level to international alliances (Cartexo de Castro et al., 2019). Henceforth, KM approaches can enhance the management of agricultural knowledge (Lwoga et al., 2013). However, Ichijo and Nonaka argued that KM approaches are widely used to support business development in the developed world (2007). Nevertheless, some scholars (Mosia & Ngulube, 2005; Cartexo de Castro et al., 2019; Agyemang et al., 2019 and Eftekharzadeh, 2008) observed that KM approach can deal with indigenous knowledge (e.g. tacit knowledge) by converting it into a more explicit form (Lwoga et al., 2013), because KM method provides the process of obtaining, storing, sharing and applying knowledge by individuals and groups (Fullwood & Rowley, 2017; Rowley, 2001; and Soliman & Spooner, 2000) with the pace of change to enhance their existing knowledge (Agyemang et al., 2019). Therefore, some social scientists (e.g., sociologists and anthropologists) proposed several conceptual models for KM regarding agriculture. Nonaka et al., (2000) developed his SECI (socialization, externalization, combination and internalization) model (first introduce by Nonaka & Takuchi in 1995); the process of knowledge creation through conversation between tacit and explicit knowledge through socialization, externalization, combination and internalization; and '*ba'* (e.g. especially means the condition, place and environment) which offers a context within which knowledge is shared, created and utilized (Agyemang et al., 2019:03) (Figure 2).

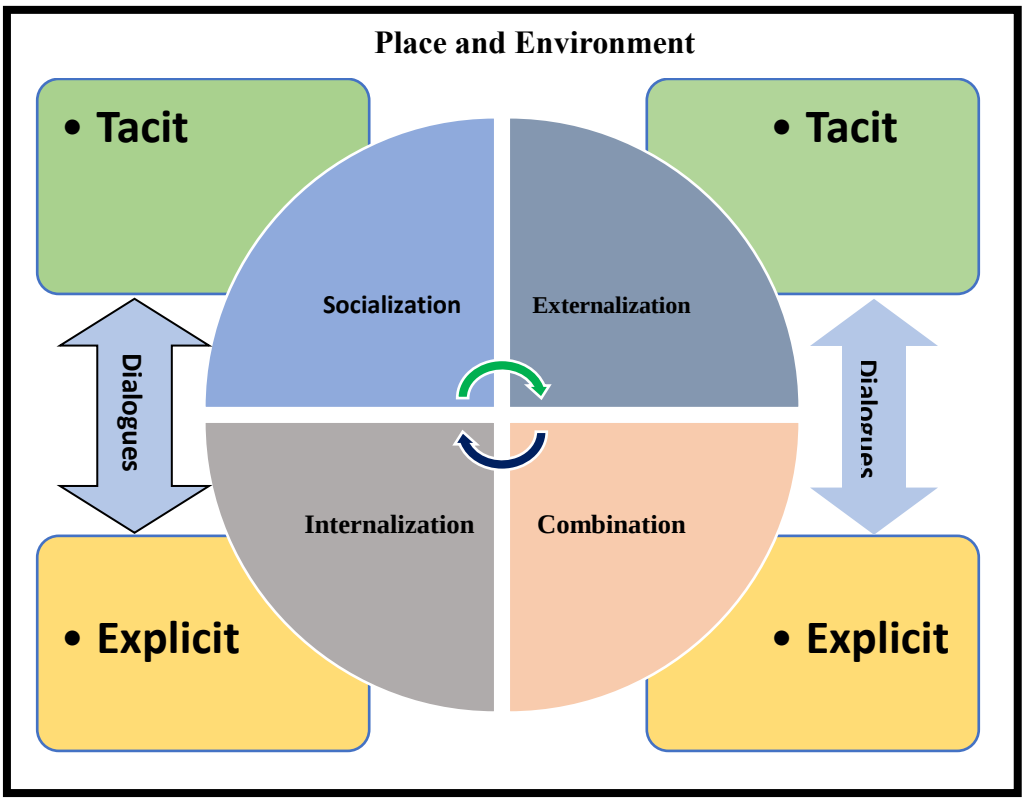


Figure 2. Knowledge creation process. Source: Nonanka and Takeuchi (SECI- Model, 1995).

In contrast, Probst et al. (2000) emphasized KM process that includes knowledge identification, acquisition, development, retention, distribution and utilization (cited in Lwoga et al., 2013). Likewise, Small and Tattalias (2000) posits a KM model that emphasized the role of several aspects (such as strategy, measurement, policy, content, process, technology, and culture) in enabling or influencing knowledge production activities. On the other hand, Frid, (2003) suggested a KM model that stresses the knowledge maturity assessment levels and knowledge management implications depending on five successive maturity levels: knowledge chaotic, knowledge aware, knowledge focused, knowledge managed and knowledge centric. Demerest's (1997) KM model emphasized the production of knowledge within an organization, with both scientific and social contributions (Mohajon, 2017:26). A modified version of Demerest's (1999) model can demonstrate the influence of both social and scientific paradigms of knowledge in constructions

(Figure 3). Within this framework, knowledge is examined as having economic value with respect to the prediction of organizational output and the procedures by which the model switches between its phases (Rowley 2000).

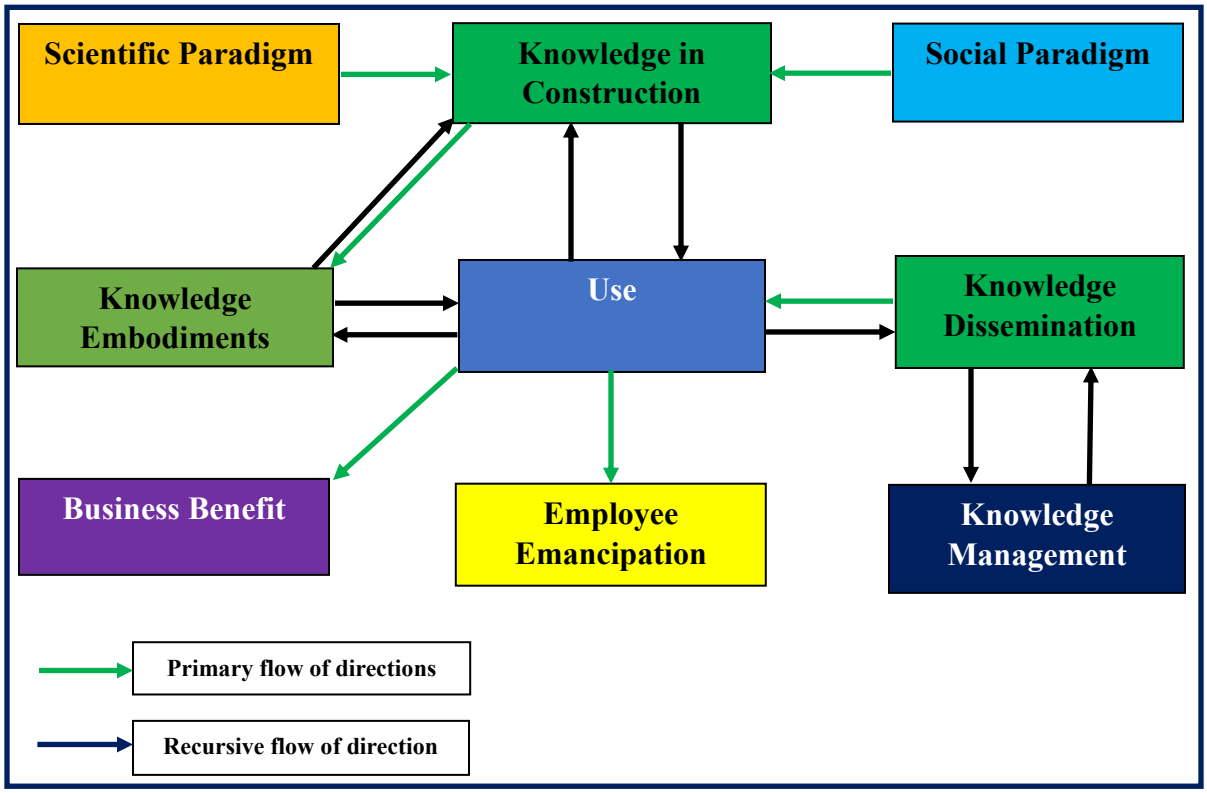


Figure 3. Demerest's modified KM model (Source: Mohajon, 2017)

In order to comprehend the structure and aims of agricultural KM, it is essential to consider the agro-industrial sector's aforementioned characteristics, as the key aspects of knowledge management application are very context-dependent. Agriculture relies on natural factors, and it is characterized by features such as seasonality, outdoor performance influenced by temperature variations, and perishability of food products, which impose strict timing constraints on storage and trade. These indicators document the risky nature of agricultural operations. Modern agriculture is increasingly reliant on information, evolving quickly, and complicating farm management. Proficiency and expertise are essential for the success of farmers. Disseminating information and knowledge in agriculture encounters challenges such as diverse users, interdisciplinary connections, and flexible access to information and knowledge (Carrascal et al., 1995, cited in Zecca et al. 2017). The agricultural knowledge base is a valuable asset of knowledge

management, including scientific and particular information related to agricultural productivity and innovation. Creating a knowledge base requires certain techniques, including group experimentation, sample creation, and innovation implementation (Labarthe, 2009). The concept of a "agricultural knowledge system," which was proposed by Cerf et al. (2000), encompasses all of the institutions, advisers, education, and research that are involved in the construction of sustainable agriculture (Zecca et al. 2017). This definition highlights the interest of production and acquisition of knowledge within the framework of a partnership between the actors of the general agricultural world (Soulignac, 2012). KM in the context of rural development entails the realization of the primary functions of management that are centered on the resources of individualized, codified, and established knowledge, as well as the processes that involve their participation and the condition under which the process are realized (ZiemianVczyk et ai., 2014).

4.4. KM for SK and IK Integration

Bohensky et al. (2011) cited Nadasdy (1999) with special reference to the term “project integration” that showed the false assumption about what indigenous knowledge is. And the answer is completely misleading, because there is a role of power relationship between indigenous people, state and the international community (Bhohensky et al., 2011). Therefore, some scholars (Atran, 2001; Verran, 2001; Cruikshank, 2005) have disagreed about the integration of indigenous and scientific knowledge especially on the ground of conceptual model and ontologies. On the other hand, some (Rist & Dahdouh-Guebs, 2006; Houde, 2007) repute that the possibility and necessity of integration (between indigenous and scientific knowledge) is growing. According to Maffi (2001) and Maffi and Woodley (2010), indigenous knowledge is very vital for maintaining both cultural and biological diversity, as the two are closely linked. Furthermore, Edwards and Heinrich (2006) also claimed that the best way to value and protect this knowledge is through integration, which benefits both scientists and local communities interested in maintaining diversity (cited in Bohensky et al., 2011). Some scholars believed that these types of knowledge provide invaluable information for science and natural resource management and sometimes answer questions that go beyond science (Usher, 2000; Howden, 2001; Nelson, 2005, Aikenhead & Ogawa, 2007, Houde, 2007). Nonetheless, the literature mentioned above provided motivation for integrating knowledge that is neither mutually exclusive nor entirely harmonious (Bohensky et al., 2011). Another group of scholars, such as Walker et al. (2006), emphasized the knowledge

integration with proper management is capable, as a social-ecological system, of withstanding disturbance without changing structure, function, feedback and identity. Whereas Redman & Kinzing (2003) stressed flexibility in response to the dynamics of environmental and social context; and Plummer & Armitage, (2007) signified the co-management of knowledge that enables knowledge to be integrated through collaboration, that can build social as well as ecological resilience.

Numbers of research work (e.g., Gusmao Caiado et al., 2018; Kivila et al., 2017; Rosati and Faria, 2019; Chang et al., 2018, Reijsen et al., 2015) focused on the importance of KM for gaining institutional competitive advantages, aiming at achieving organizational sustainability. Besides, KM is considered as a new catalyst of development for achieving the goal of improvement in accordance to the principles of social, environmental, and economic sustainability (Chang et al., 2018; Faber and Engelen, 2005; Reijsen et al., 2015; Yigitcanlar, 2011). Nonetheless, a very few research (Lwoga et al., 2013; Cartexo de Castro et al., 2019; Gardeazabal et al., 2021; Islam, 2010; Lopez et al., 2021; Mokhtari et al., 2005; O'Connor et al., 2017; Siebers et ai., 2003) investigated the applicability of KM for agricultural sustainability, especially in terms of incorporation of both indigenous (local) and scientific (global) knowledge. Masinda (2013) stated that with advancement of science and technology, agricultural sector and smallholder farmers of developing countries have the opportunity to utilize technological well-being, whereas certain reservations remain about the inappropriate use and inefficient knowledge of these technologies by farmers, implying serious environmental hazard. In this respect, KM in agricultural sector can contribute by providing models and approaches focusing integration of (indigenous and scientific) knowledge for ensuring environmental stability and boosting productivity. According to King (2009), KM functions within the organization stimulate knowledge processes (i.e., knowledge creation, storage, sharing and application), develops methodologies and inspires people to participate in it.

5. Impediments towards knowledge integration: The impact of globalization and migration

Knowledge integration denotes the amalgamation, synthesis, and dissemination of varied knowledge forms from disparate sources, disciplines, or civilizations. This process is essential for promoting innovation, corporate development, and social advancement. Nonetheless, information integration is frequently obstructed by several causes, such as institutional, cultural, language, and geographical impediments. Globalization and migration, two interrelated issues, significantly

influence these obstacles. This literature review analyzes the obstacles that globalization and migration provide to knowledge integration, emphasizing the impediments arising from cultural disparities, communication difficulties, and institutional frameworks.

Globalization has resulted in an augmented exchange of information, ideas, technology, and human capital across national boundaries. It has established a global network that facilitates the unrestricted flow of knowledge. Nonetheless, the same dynamics of globalization that facilitate information dissemination also generate several obstacles to efficient knowledge integration. Globalization promotes the interchange of ideas among civilizations; nonetheless, cultural disparities frequently hinder knowledge integration. Kogut (2000) posits that information communication across firms from disparate nations may be obstructed by variances in organizational cultures, resulting in misconceptions and misinterpretations of knowledge. Moreover, linguistic disparities impose further obstacles to communication, obstructing the seamless exchange of information and impeding the integration process (Van den Bosch et al., 2003). Globalization frequently subjects firms to diverse institutional settings, including varying legal frameworks, regulatory systems, and business practices. Institutional disparities can hinder the integration of information across borders, as people and organizations may possess varying perceptions of what is deemed "valid" or "useful" knowledge (Szulanski, 1996). North's (1990) study emphasizes that institutional contexts frequently determine the legitimacy of certain knowledge categories, hence affecting the efficacy of knowledge integration. Globalization facilitates the sharing of information but may also result in knowledge lock-in, as specific knowledge practices prevail over others. The notion of "path dependency" (David, 1985) posits that organizations or societies may get entrenched in specific modes of thought or action as a result of their historical context or prior decisions. This may constrain the flexibility and adaptability essential for effective knowledge integration.

Both voluntary and forced migration significantly contribute to the transference of knowledge across boundaries. Migrants possess a variety of skills, experiences, and information that may be assimilated into their new surroundings. Nonetheless, many circumstances may impede the seamless assimilation of this knowledge. Migrants frequently have difficulties in acclimating to novel social, cultural, and institutional environments. Portes (1995) asserts that the assimilation of migrants into the social structure of their new communities is frequently intricate and laden with

conflicts. Such conflicts can obstruct the transmission and integration of information, since migrants may be marginalized or removed from decision-making processes. This social marginalization might hinder the dissemination of important information held by migrants. A significant obstacle to knowledge integration in migration is the lack of acknowledgment of foreign degrees and abilities. Research indicates that migrants frequently have challenges in obtaining recognition for their education, skills, and professional credentials in host nations (Bauder, 2003). The disparity between migrants' expertise and the credentials demanded in the host nation might hinder their capacity to participate in knowledge integration activities. Migration frequently leads to labor market fragmentation, when migrants assume low-wage, low-skill positions. This may restrict their capacity to assimilate their expertise into more active sections of the economy. According to Castles and Miller (2009), migrants frequently face legal, economic, and social restrictions that hinder their access to advanced knowledge jobs, hence limiting the effective use of their expertise and abilities.

Globalization and migration are interrelated processes that exert a complicated, dual influence on knowledge integration. Globalization facilitates the movement of individuals, commodities, and concepts; nevertheless, migration introduces an extra degree of complication to this process. The interplay between these two factors can either facilitate or obstruct knowledge integration, contingent upon the situation. Migration enhances the diversity of information sources in a worldwide context. This variety can enhance knowledge integration by introducing novel viewpoints, ideas, and activities (Pries, 2001). This variety may also provide issues, since disparate knowledge systems might conflict or be challenging to reconcile. Migrants frequently establish transnational networks linking their countries of origin and destination. These networks can enhance the exchange of knowledge across many settings, generating potential for knowledge integration. The efficacy of these networks is frequently influenced by the level of social, political, and economic integration within the host community. Migrants' capacity to engage in these networks and facilitate knowledge integration is contingent upon their social capital and the degree of acceptance within the host society (Schiller et al., 1995). Globalization and migration may result in both "brain drains" (the flight of highly trained persons from developing nations) and "brain gain" (the influx of competent workers into affluent nations). The latter can facilitate knowledge integration in the host country, whereas the former deprives developing nations of essential

information and competence (Beine et al., 2001). The disparate distribution of knowledge flows can engender worldwide disparities in knowledge integration.

Globalization and migration offer both advantages and obstacles for the integration of knowledge. Although these phenomena promote cross-border information sharing, they also present considerable obstacles that must be addressed. Cultural disparities, linguistic obstacles, institutional incongruities, social marginalization, and the lack of qualification acknowledgment are significant challenges to knowledge integration. Confronting these problems necessitates a comprehensive strategy, encompassing enhanced acknowledgment of migrants' competencies, more inclusive policies, and initiatives to reconcile cultural and institutional disparities. Comprehending the processes of globalization and migration is essential for enhancing knowledge integration and maximizing the potential of varied information sources in a more interconnected world.

6. Conclusion

The aim of this chapter is to identify the relevant literature regarding the KM model for achieving agricultural sustainability. It also identifies the research gap between the knowledge system (both indigenous and scientific) and a proper combination of knowledge within the KM framework. This review reveals that there are local farmers who possess IK and agricultural experts who possess scientific knowledge. According to Alemu et al., knowledge in agriculture (especially in developing countries) has been applied in an isolated and fragmented manner (2018). Therefore, this review will give light on the importance of sharing and integration of knowledge that essentially suggested an appropriate model for KM. Above mentioned reviews investigated the roles and practices of knowledge agents for knowledge sharing and integration in KM model development. The research has also made significant contributions in terms of theoretical, methodological, and practical significances. Theoretically, the research can add to the body of knowledge on the functions of farmers and agricultural specialists as agents and shared KM as a border object for integration and sharing. It can also shed light on the Nonanka and Takeuchi's SECI- Model (1995) and Demerest's modified KM model (1999) for the better understanding of knowledge sharing and integration in KM development for agricultural sustainability. This review contributes methodologically to developing a system for a complete understanding of a research

area such as KM, integration of knowledge and knowledge sharing in the context of agriculture. This literature review indicates that there is a lack of academic research on the implications of KM regarding knowledge sharing and proper integration in the context of agricultural development. Besides, the investigation elucidates how KM approach can facilitate the integration of knowledge and establish a knowledge exchange system to ensure the effective administration of agricultural knowledge. It will encourage researchers, academics and policy experts to include KM as a model in their research as a tool for agricultural knowledge management in the developing world.

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Chapter Three[5]

Bridging Science and Society:

The Integration of Indigenous and Scientific Knowledge Management

1. Introduction
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Bridging Science and Society:

The Integration of Indigenous and Scientific Knowledge Management

Abstract:

The lack of effective incorporation of indigenous knowledge and scientific knowledge is one of the main pitfalls of recent west-led economic development strategies in emerging economies. Under the influence of scientific progress, economic development demands a comprehensive, viable, and innovative knowledge management model capable of synthesizing scientific and indigenous knowledge that may ensure sustainability. This research paper analyzes the developing economy and society of Bangladesh, specifically focusing on the behavioral intention to use knowledge management as a tool for ensuring agricultural sustainability in a rural area. The use of knowledge in agriculture involves the exchange and integration of different sources of information and experiments embedded in the particular culture, values, and institutions of both traditional and modern scientific actors. The aim of this study is to assess the use of knowledge integration between science, standing for global knowledge, and society, standing for local indigenous knowledge. We introduce these locally informed perspectives about development to promote an appreciation of indigenous know-how where west-led knowledge has many stakeholders trying to promote different interests and agendas. Therefore, this research proposes a coherent combination of both knowledge management systems for ensuring sustainability.

Considering the farmer-supplier interaction inside the agricultural supply chain, we evaluate the intention of knowledge integration and the necessity of a viable knowledge management model under the Theory of Planned Behavior. The empirical analysis investigates an original dataset built through ad hoc questionnaires administered to farmers and their suppliers from rural Bangladesh. The results of Structural Equation Modeling demonstrate that the synthesis of knowledge between local indigenous and global scientific sources through knowledge management promotes agricultural sustainability, benefiting economic performance and development of rural areas.

The outcome of the research will encourage donors, agencies, and policymakers to rethink their projects and shed light on the significance of local expertise, experiences, and biodiversity for ensuring sustainability of economic development initiatives.

Keywords: IK, Scientific Knowledge, Knowledge Integration, Knowledge Management Model (KM), Agriculture, Bangladesh.

1. Introduction

Since the beginning of the 20th century, knowledge has become a popular discourse in the field of social and economic progress (Florianczyk et al., 2012). The debate has started questioning the nature of knowledge, as represented by scientific technology and tradition. Proper usage of knowledge is a crucial factor of production, also in a knowledge intensive sector, like agriculture (Hoffman et al., 2015). The role and spectrum of knowledge regarding the agricultural process spurs the reinvestigation of how knowledge is affecting the performance of farm production (Durand and Van Huylenbroeck, 2003). For instance, Western development strategy emphasizes the roles to be played by SK and innovation in terms economic progress (European Commission, 2010), while at the same time recognizing that a reluctance of some parts of our societies to adopt innovation is major obstacle to development (Florianczyk et al., 2012). By the end of 20th century, the word 'development', especially in Third World's perspectives, had become an elusive concept for its West-led top-down approach that offers a solution based on scientific method (Briggs and Sharp, 2004). On the other hand, the tendency to hear the voice of others (Spivak, 1988; Hooks, 1990 and Goss, 1996) and expertise of local (i.e., related to a specific context) people has to be incorporated into development practice. Nevertheless, people have developed a different view about nature, yelled in traditional system of beliefs, which they use to understand and interpret their biophysical environment (Iaccarino, 2003) termed as indigenous knowledge embodies a treasure of wisdom and experience of nature acquired over millennia from direct observations, and transmitted most often over generation (Mazzocchi, 2006). This perspective focuses on the specific capabilities developed in a local context, which generally contrasts towards a global one-size-fits-all approach to knowledge. Conventionally, knowledge for agricultural development is obtained through an agricultural extension approach which involves transferring technology from agricultural research and disseminating this information to farmers (Radcliffe et al., 2020). However, the transfer of technology often overlooks the crucial human aspect of sustainable agriculture, including indigenous knowledge. Instead, it primarily emphasizes the distribution of scientifically derived technical solutions that aim for increased yields and greater profits (Warburton and Martin, 1999). The lack of strong connections between scientific knowledge (SK) and indigenous knowledge (IK) is further exacerbated by the exclusion of indigenous knowledge from mainstream society (World Bank, 2005; and UNDP, 2012).

The lack of a comprehensive framework for integrating local IK and global SK is a significant drawback for the progress of economies in the Third World. The process of integrating knowledge in agriculture entails the interchange and integration of many sources of information and experiments, which are deeply rooted in the specific culture, values, and institutions of both traditional and modern scientific players (Kamakaula, 2024). Due to technological advancement, economic development requires a comprehensive, feasible, and creative strategy for sustainability (OECD, 2001; Miah et al., 2020). Our study examines IK, and it highlights its integration with global SK within Knowledge Management (KM) model, to ensure the sustainability of development policies.

The findings of this paper support that mature and traditional sectors, like agriculture, require a comprehensive and viable model for knowledge integration, complementing those practices based on what is modern, global and scientific and those based on what is traditional, local and indigenous. This study integrates anthropological and managerial perspectives, contributing to both disciplines and highlighting the universal significance and implications of the KM in terms of agricultural sustainability. Throughout a survey-based empirical analysis of a Bangladesh rural area, this research focuses on the opportunities and demands for agricultural KM, which integrates both scientific and IK-KM in accordance with the intentions of stakeholders. This research anthropologically and managerially analyzes the farmers and their stakeholders from rural Bangladesh, who are adopting modern scientific technology without having any expertise or training. Although they are partially aware of the feasible consequences of the extensive or mindless use of scientific technology without considering ecological balance. This analysis documents that farmers believe in a viable KM, which could provide an opportunity to integrate their indigenous (own, traditional, and local) knowledge with others' scientific (external, modern, and global) knowledge, aiming at economic development and, contemporarily, at the sustainable utilization of natural resources, preservation of local diversity and ecological balance. Thus, this study provides solutions for integrating knowledge at the interface between science (i.e., modernity) and society (i.e., indigeneity) by assessing the behavioral intention and psychological objectives of the stakeholders. In this line of thought, the current study employed the Theory of Planned Behavior (TPB) as a conceptual framework to measure the intention to integrate scientific technology and indigenous beliefs within a KM, and the roles of the stakeholders in such sustainable KM approach. The investigation utilized a unique data set constructed by conducting

face to face interviews with farmers and suppliers from a specific research location in rural Bangladesh. The results of the structural equation modeling revealed that KM is expected to be a powerful and effective tool for the integration between IK and SK

2. Literature Review

2.1. The Ambit of Knowledge: Towards Science through Society

The term "knowledge" may refer to either the actual facts or situations with which one is acquainted or the abstract ideas and concepts that one has learned about via formal education or personal experience (Trumble, 2007, cited in Ahmmed, 2015: 06). Knowledge can be defined as "justified true belief" (Nonaka and Takeuchi, 1995: 87), which incorporates three basic conditions: 1) the truth condition; 2) the belief condition; and 3) the justification condition (Neta and Pritchard, 2009). For the contextual and cultural formulation of a "true belief", these conditions are usually synthesized in a logical format (Bolisani and Bratianu, 2018). There are three connected types of knowledge: a) experimental knowledge; b) skills; and c) knowledge claims (Dombrowski et al., 2013). Experimental knowledge is a result of the active participation of both the body and mind, combining emotional, rational, and spiritual knowledge. Consequently, skills demonstrate how to do something based on experimental knowledge or based on the know-how developed at performing repeatedly a certain task and learning by doing it (Bratianu, 2015). This type of know-how/skills is "cultural specific" and has close connection with practical and factual knowledge (Odora Hoppers, 2005: 2-3). Thus, justification of true beliefs is compelling with the context (e.g., the environment, the culture and the social biography) and the reasoning level of the person making a knowledge claim (Horsthemke, 2008: 136). According to Nonaka and Takeuchi (1995) "there is a significant difference in interpreting the definition of knowledge as "justified true belief" (p. 87), because modern epistemology focuses on *truthfulness* as the pillar characteristic of knowledge, whilst the traditional epistemology emphasizes on an "absolute, static and nonhuman nature of knowledge" (p. 85). The former is often associated with Western technology or practices (Faisal, 2010), whereas the latter is mainly known as 'indigenous knowledge': "the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area." (Grenie, 1998: 1). This type of knowledge has the specific characters of being cumulative, because it grows and enriches with "generations of

experiences, careful observations, and trial-and-error experiments", and dynamic, because "new knowledge is continuously added", innovating from within and also internalizing "external knowledge to suit the local situation" (Grenie,1998: 1). Actually, knowledge as "justified true belief, as is done in the traditional Western epistemology", should be abandoned because it presents us with "an absolute, static and nonhuman view of knowledge and fails to address the relative, dynamic and humanistic dimension of knowledge" (Nonaka et al., 2000:13-29). The idea of Indigenous Knowledge (IK) has manifested its ambit from the very beginning of human origin (Mohan, 2024) although from the beginning of its academic manifestation, it was typically characterized in terms of criticisms towards Western knowledge, development, and hegemony (Horsthemke, 2004a). IK has appeared with its relevance as a reclamation of culture or traditional heritage; decolonization of mind and thought; recognition and acknowledgement of self-determining development; protection against further colonization, exploitation, appropriation and/or commercialization; legitimization or validation of indigenous practices and worldviews (Semali and Kincheloe, 1999a; Higgs et al., 2004; Odora Hoppers, 2002a, 2005) and condemnation of, or at least caution against, the subjugation of nature and the general oppressiveness of non-indigenous rationality, science and technology (Semali and Kincheloe, 1999b).[i] IK

According to Danielson et al. (2014), scientific knowledge (SK) embraces the critical processes of testing and observation in order to examine the components of universe systematically from both a physical and natural viewpoint (Nicholas-Figueroa et al., 2017). Therefore, SK is based on analytical processes and a reductionist approach, while IK is typically holistic, culture specific and it depends on subjective and qualitative method (Mazzocchi, 2006). In IK there is no exploitation of nature, but "the interaction between humans and nature milieu" (Mazzocchi, 2006: 01). Thus, indigeneity encompasses a profound cultural dimension and symbolic construction where each action is meticulously ritualized, enabling humans to actively contribute to the preservation of the natural order. On the other hand, SK isolates its objects of study from their vital context by putting them in simplified and controllable experimental environments – which also means that scientists separate themselves from nature, the object of their studies (Nakashima and Roue, 2002). Within this distinction, it is recognized that SK assumed as an authoritative knowledge of the West, which has made its dominance in ordering all aspects of social life (Purcell, 1998). Accordingly, IK was typically taken as an obstacle to development, while it has claimed as an 'epistemological disenfranchisement' (Odora Hoppers, 2005: 8, 14), 'defeated knowledge' (Odora Hoppers, 2005:

14,17), and ‘subjugated knowledge’ (Semali and Kincheloe, 1999b: 31-32) in the conventional development doctrine. Thus, the supremacy of Western knowledge is not explained by a privileged closeness to the truth, but rather by a mix of historic-geographical circumstances linked up with the geopolitics of power (Escobar, 1995). In this sense, IK can be termed as the body of historically constituted knowledge that is instrumental in the long-term adaptation of human groups to the biophysical environment. In this context, development projects should be designed including the IK of people to whom the projects are addressed, rather than rely on the universal acceptability and superiority of SK and ‘developmentalism’ (Escobar, 1995), thus redefining and diversely informing the concept of development *per se* and its aims (Sillitoe and Marzano, 2009).

2.2. Knowledge Management: Tools for Integration of Agricultural Knowledge

Knowledge is considered the fourth component of production, following labor, land, and capital (AFAAS, 2011) since knowledge governs economy and society (Khan, 2005:61). Knowledge thus emerged as the fundamental axis that guided both the science and society (de Castro et al., 2019). Therefore, without acquisition, creation, storage and diffusion of knowledge it will be very difficult to ensure economic growth and sustainability. Because knowledge has been recognized as a powerful driver of competitive advantage (Silvi et al. 2006) and a crucial element for organizational growth through this volatile knowledge-based economy (Zaied, 2012). Hence, the importance of KM is growing in all sectors of the global economy by fostering knowledge creation, codification, preservation and transfer, improving the value of an organization (Fullwood & Rowley, 2017; Njiraine, Ocholla & Onyancha, 2010; Pathak & Nigam, 2017). In this context, KM provides the acquisition, organization, and dissemination of human capital (Coleman, 1988:100) which has become the most critical objective among the developing nations (Serenko, 2013). KM involves the administrative actions that facilitate the processes of obtaining, producing, storing, sharing, disseminating, developing, and implementing knowledge by individuals and groups (Fullwood & Rowley 2017; Rowley 2001; Soliman & Spooner 2000).

According to Lwoga et al. (2010) an effective KM provides a possible combination of “explicit” and “tacit” knowledge where explicit knowledge is expected to be formal and expressed in systematic languages in the form of data, scientific formula, specification and manuals (Nonaka,

Toyama & Konno, 2000); whereas tacit knowledge is non-verbalized, intuitive, undocumented and unarticulated (Polanyi, 1962). Eftekharzadeh (2008) argued that KM may deal with tacit knowledge by either converting it to a more explicit form or improving tacit knowledge flow via improved human interaction (e.g., socializing activities, motivation, and appropriate reward and recognition systems. Therefore, managing IK—which is mostly tacit or dormant in behaviors and experiences—is challenging since it is very personal, hard to define, and diffuse (Lwoga, et al. 2010). KM mitigates disparities in interests and authority, fostering the interchange of information and facilitating learning, and thus possibly facilitating the integration between indigenous and SK (Bode, 2007)). With global change, KM has become more important because people need to enhance their existing knowledge for coping with the current sprang of political economy (Agyemang, et al., 2019). A rising corpus of research focuses on information sharing, which is related to a firm's ability to develop knowledge and innovate, as also fostering its performance (Dong et al., 2017, Lin, 2007; Wang and Wang, 2012). When knowledge is shared among different units, not only do those units acquire information in a linear manner, but they also pass it on to others and provide feedback in the form of questions, amplifications, and modifications (Quinn et al., 1996). Lack of knowledge sharing can hinder an organization's ability to utilize the valuable knowledge it possesses, which is the most important asset in a knowledge-driven economy (Jung et al. 2017).

Research on knowledge sharing that focuses on the integration of indigenous and SK is scant. A very insightful work by Siebers (2003) studies a Guatemala village and reveals that there was a process of knowledge creation and dissemination between IK and scientific knowledge driven by modern scientifically elaborated knowledge: farmers saw their cultural connection with the Q'eqchi society as hierarchical, putting Western culture at the top. Q'eqchi society mixes current agricultural expertise with their indigenous "na'leb" wisdom into their own cultural worldview. (Siebers, 2003: 31-50). This integration process emphasizes on shared beliefs, values, and cognitive uniformities as part of "social informatics" that places "knowledge-networking" at the center of knowledge creation, use, and dissemination within and across knowledge communities (Hakken, 2003). In this context, KM appears to empower communities to engage in innovation, foster creativity, and oversee their own knowledge, while also integrating alternative knowledge systems. This process is crucial for reinforcing policies and initiatives aimed at promoting sustainability.

2.3. Agriculture and development in Bangladesh: Motivating Knowledge Integration

Bangladesh is a fast-growing economy, reaching +6% growth in 2003-04 and 7.1% in 2022/2023 (Barai, 2020). The World Economic Forum predicts that Bangladesh will be the next 'Asian Tiger' despite its massive population (tenth largest in the world) and little territory (WEF, 2017). Since its founding, this area has had an agricultural mode of social construction, with agriculture providing all raw materials for industries and logistics for other sectors (Gregorio et al., 2016). This sector has reduced poverty from 9.0% in 2016 to 5.0% in 2022 (World Bank, 2023). Although it contributes much to the economy, the performance of the agricultural sector is not satisfactory, producing 11.22% of the GDP in 2022, in spite of 37.09% of labor force employed (Dhar et al, 2018a; BER, 2014). The bulk of farmers in Bangladesh, use traditional agriculture on tiny plots of land without scientific understanding. Farmers' knowledge, beliefs, and practices have underpinned thousands of years of agricultural expansion (Lwoga et al., 2010). With the global advancement of science and technology, Bangladesh has also adopted "modern" agricultural techniques. This modernity introduced high-yielding seeds for mass production, chemical inputs, and hybridization without considering local capabilities and skills Modern agriculture is causing a significant loss in the crop genetic resource in the Third World (Singh and Singh, 2017), including Bangladesh. Although modern technologies have changed food production in a numerical sense, they imbalanced the agro-ecosystem (Islam, 1996), because their imperfect use exposes to the environment, and threatens its long-term sustainability.

Several studies have investigated the agricultural development of Bangladesh on the basis of current mechanization and technological innovation (Rahman et al. 2021; Jones et al. 2017; Tabassum & Rezwana, 2021; Islam and Rashid, 2016), its contribution on economic growth (Sultana and Sadekin, 2023; Tisdell et al. 2019; Hasan et al. 2017; Alam et al. 2009) and policy implementation (Quisumbing et al. 2021; Karim & Noman, 2018; Rashid et al. 2018; Mohammad, 2012). On the other hand, a bunch of scholars (Sillitoe et al. 2002, Rahman, 2012; Pizzo, 2015; Chen and Zhen-yu, 2022; Lishchuk et al. 2023) have raised concern about the unforeseen uses of scientific technologies in terms of ecological and environmental hazard. These scholars (e.g., Ellan & Harris, 2000; Kalland, 2000; Leach & Mearns, 1996; and Sillitoe, 1998) presented a discourse of 'alternative development' model that puts emphasis on peoples' voice, local expertise, and IK stratum, i.e., to questioning scientific approaches as being the best, or the only, solution to

development problems (cited in Briggs & Sharp, 2004:662). The valorization of IK could empower the role of local people also in stakeholder negotiations (Stillitoe, 2002). In such a revised model of development, the holistic combination of "the technical know-how of natural scientists with the cultural empathy of social scientists" should be targeted, aiming at "facilitating communication and collaboration between all actors through the advancement of interdisciplinary fashion" (Sillitoe and Marzano, 2009: 13,23). To the best of our knowledge, in previous research neither knowledge management has ever discussed an indigenous approach to the concept of knowledge, nor the anthropologic studies have ever overpassed the disciplinary borders towards managerial approaches to knowledge. This research is located on the crossroad, and it offers an anthropologically informed perception of knowledge management, empirically testing a model for the sustainable integration of global, modern and scientific KM with the the local, traditional and IK. Under the TPB rationale, motivated by both growing interest in anthropological and business studies around the concept of knowledge management, this research provides an empirical application of the far long deserved "alternative development", that would be peculiarly suitable in the context of agricultural Bangladesh, but it is also appropriate for any other rural or non-rural context, where tradition needs to survive and combine to innovation pursuing development of the society.

3. Conceptual Framework: The Theory of Planned Behavior

The present study employs a socio-psychological model, rooted in the Theory of Planned Behavior (TPB) proposed by Ajzen (1991), to examine the factors influencing people's intention to choose KM as a tool for the integration between modern SK and IK in the agricultural sector. TPB is a social cognitive paradigm aimed at explaining the variation in volitional behavior (Yazdanpanah and Zobeidi, 2017), on the basis of the theory of reasoned action (Fishbein and Ajzen, 1975), and the model of interpersonal behavior (Triandis, 1977). Numerous researchers (Alavi & Leinder, 2001; Jalili & Ghaleh, 2020; Vries et al., 2006; Reychav & Weisberg, 2009; Yang, 2010; Philsoophian et al., 2016; & Ahmad, 2017) concentrated their attention on the intentions of knowledge sharing, but they rarely paid attention to the actual behaviors of knowledge integration. A number of empirical studies, using a variety of methods, have provided support for these viewpoints, which acknowledge that the desire to conduct a certain sort of action plays a significant role in predicting actual behaviors of that kind (for a review, see: Webb and Sheeran, 2006).

According to Ajzen (1991), TPB extended the Theory of Reasoned Action (Fishbein and Ajen, 2010) by adding a construct called perceived behavioral control to account for factors outside the individual's control that may affect one's intention and behavior (Sabah, 2016). In TPB, behavior is determined by the intention to act, reflecting the motivational factors and the intended efforts to perform the behavior (Ajzen, 1991). According to TPB, three variables may be antecedents to the intention to behave: personal attitudes, subjective norms and perceived behavioral control.

4. Empirical Model and Description of the Variables

We adopt TPB approach assuming to examine the intention to employ KM as a tool for integration between indigenous and scientific knowledge, as a predictor of the decisions of using KM to integrate indigenous and SK (Limpo et al., 2022). The application of TPB requires an empirical research model that involves three key sets of variables to understand the actual behavior of knowledge integration, considering the intention to behave. Each variable set is defined and operationalized to comprehensively analyze their impact on knowledge integration and usage intentions in three steps:

1. Attitude towards Knowledge (ATK). Attitude generally represents the tendency to react positively or negatively to an issue, person, organization, or occurrence (Ajzen, 2006). De Jong (2000) identified attitude as a valued objective that assists in defining behavioral intention to use KM for knowledge integration. ATK, in particular, can be conceived as an individual's evaluation of whether a person favors or not the behavior of becoming a knowledge user. For measuring people's ATK, this study used four statement items (shown in Table 1).

2. Subjective norms towards knowledge (SNTK). They represent the social pressure exerted on individuals, leading them to execute or refrain from an action under specific conditions (Ajzen, 2005). In this study, SNTK refers to a person's belief or perception pushing him/her to comply with the direction, recommendation, or request of other people (social pressure) and can motivate the individual to become a certain source of knowledge. To measure SNTK behind the intention of using knowledge source, this study singles out four influential statement items (shown in Table 1).

3. Perceived behavioural control (PBC). According to the TPB model, PBC is influenced by several factors, such as individuals' skills, resources, opportunities as well as their prior

experiences in performing similar behaviour. External factors - such as the availability of social support or the presence of impediments, that make, respectively, easier or more difficult to perform the behavior - also influence it. PBC can be conceived as a person's impression of the difficulty or ease with which a behavior can be performed (Ajzen, 2005). Following dominant research, PBC is measured by means of four statement items (shown in Table 1).

According to the TPB, the central factor in this study is behavioral intentions towards knowledge (BITKM), which are assumed to capture the motivational factors (ATK, SNTK and PBC) that influence behavior (Ajzin, 1991).

Thus, the three groups of motivational factors (independent variables) allow us to explain the central factor (dependent variable), i.e. BITKM. The dependent variable BITKM is the predicted mediator with the other dependent variable knowledge integration (KI). In general terms, the subjective possibility of an individual engaging in a behavior is known as the individual's intention to perform (Ajzen, 1991). In that sense, a person's behavioral purpose can be defined as his/her decision to carry out or abstain from a specific behavior in a given situation. Following Ajzen's (2005), BITKM and KI are proxied by four statement items (shown in Table 1).

According to the model, the relationship between dependent and independent variables predicts a positive effect of the motivational factors (ATK, SNTK and PBC) on BITKM, and consequently on KI.

Conclusively, three main hypotheses are tested adopting the rationale under the TPB and the empirical model described above and depicted in Figure 1:

H1: BITKM is significantly associated with ATK.

H2: BITKM is significantly associated with SNTK.

H3: BITKM is significantly associated with PBC.

H4: AKI is significantly associated with BITKM.

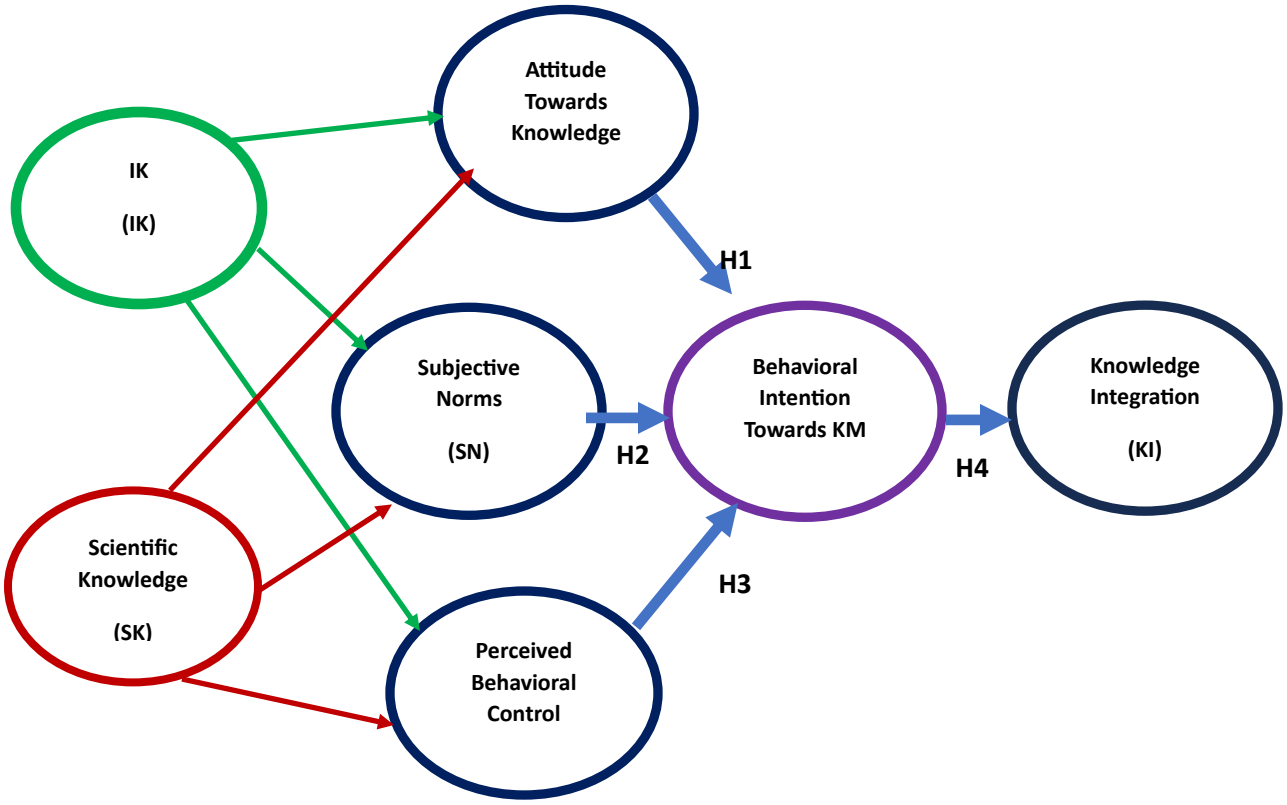


Figure 1. Research Framework (Source: own elaboration).

Table 1. Construct dimension and related statement items

Construct dimension	Items
Dependent Variable	
Knowledge Integration (KI)	1. KM unveils the hazards and vulnerabilities as well as the potentialities. 2. KM provides a platform for proper policy implementation. 3. KM is an integrated system. 4. KM creates a network among the stakeholders.

Behavioral Intention Towards Knowledge Management (BITKM)	1. KM can provide innovation, viability and build a comprehensive environment for knowledge exchange among stakeholders. 2. KM can be an integral platform for establishing interrelationships. 3. KM can be a synthetic model for using knowledge in a systematic way for proper utilization of knowledge components. 4. KM can provide a proper attribution of knowledge and certain technicalities of knowledge sources.
Independent Variable	
Attitude Towards Knowledge (ATK)	1. The lack of an integrated knowledge management system is the main pitfall of agricultural sustainability in Bangladesh. 2. The incorporation of IK and SK can improve agricultural practice and contribute to sustainability. 3. IK can be used as a technological source of knowledge. 4. Only SK can ensure agricultural sustainability.
Subjective Norms Towards Knowledge (SNTK)	1. IK is now defied/ineffective source of knowledge in terms of agricultural practice. 2. Motivational incentives and infrastructural facilities incentive for using SK in agricultural practice at present time. 3. Suppliers and buyers promote SK facilities regarding agricultural practices. 4. Training is available for the adoption of SK in terms of technology or machineries.
Perceived Behavioral Control (PBC)	1. It is difficult to use IK in agricultural practice because it is an undocumented source of knowledge. 2. The use of SK can ensure satisfaction with food demand and crop diversification. 3. The use of IK can ensure ecological balance and sustain environmental stability. 4. The incorporation of IK can contribute to food production and safety as well as provide a safeguard for the environment and eco-system.

4. Data and Methods

4.1. Description of the Research Area

The empirical analysis investigates the case of a village named '*Kakara'* in the district of Cox's Bazar – situated in the South-East corner of Bangladesh, retaining the longest sea beach in the world[6]. The village *'Kakara'* is situated in the *'Chakoria Upazila'*[7] in the district of Cox's Bazar (Figure 2). Cox's Bazar is the coastal district of Bangladesh covering a total area of 2,491.85 sq. km. (962.10 sq. miles) and consisting of 8 *upazilas*, 71 unions[8], 177 *mauzas*[9], 989 villages, 4 *paurashavas*[10], 39 wards[11] and 164 *mahallas*[12]. *Kakara* is a union of *Chakoria* upazila, consisting of 7 wards. The total area of the union (village) is 8866 acres (35.88 sq km)[13] and it is situated on the bank of a mighty river named *Matamuhuri*, that surrounds the village from the North to the West, originating from the hill tracts associate with *'Sangu'* river to fall into the Bay of Bengal. This river provides such a unique physical feature and environmental advantages, although casting intolerable natural calamities by creating frequent floods drowning the village every year. The village comprises 3,763 households and has a population of 29,825 people (in 2022)[14]; its surrounding farmland extends to an area of 2,500 acres[15]. The study area predominantly has an agrarian-based society and most of the farmers uses their IK for long. SK has recently been

[6] https://timesofindia.indiatimes.com/travel/destinations/have-you-been-to-the-longest-beach-in-the-world/articleshow/102904149.cms retained on October 28th, 2024.
[7] 'Upazila' is used by local people for indicating municipality as a sub area of a district
[8] Union councils, or union parishads, or unions are the smallest rural local government units in Bangladesh.
[9] Mauza is the lowest administrative unit having a separate jurisdiction list number (J.L. No.) in revenue records. Every mauza has its well-demarcated cadastral map. Mauza should be distinguished from local village since a mauza may consist of one or more villages.
[10] Paurashava denotes Municipality that is incorporated and administered by local government under Paurashava Ordinance, 1977.
[11] A division of a city for representative, electoral, or administrative purpose. https://www.merriam-webster.com/dictionary/ward retained on October 31st, 2024
[12] A *mahalla* (pronounced *mo-hol-la*), is an Islamic congregation or parish. Typically, a mahalla supports a single mosque. An imam is seen as the spiritual head of a mahalla. Mahallas are directly subordinate to a city or town, especially an electoral district, for ritual and representative purposes. Unlike a ward, it is an optional and non-elective unit of a city corporation or municipal corporation. *Mahalla* also means an urban neighborhood.
[13] https://bn.wikipedia.org/wiki/%E0%A6%95%E0%A6%BE%E0%A6%95%E0%A6%BE%E0%A6%B0%E0%A6%BE_%E0%A6%87%E0%A6%89%E0%A6%A8%E0%A6%BF%E0%A6%AF%E0%A6%BC%E0%A6%A8.
[14] BBS Population and Housing census, 2022. https://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b343a8b4_956b_45ca_872f_4cf9b2f1a6e0/2024-01-31-15-51-b53c55dd692233ae401ba013060b9cbb.pdf.
[15] https://kakharaup.coxsbazar.gov.bd

promoted by Western development agencies in this rural area, hence farmers adapted and today they also use SK-related technologies. Therefore, the stakeholders in the agricultural sector had to incorporate their IK within SK to gain better implications of knowledge for sustainable development. In this context, KM appears to empower communities to engage in innovation, foster creativity, and oversee their own knowledge (IK) while also integrating alternative knowledge systems (SK). This process is crucial for reinforcing policies and initiatives aimed at promoting sustainability. In the agricultural development processes, especially in developing countries like Bangladesh, the effectiveness of KM strategies within research and development portfolios are crucial (Onyeneke et al., 2018). The emphasis on maintaining sustainable local operations, based on IK, and contemporarily fostering continuous innovation, and transitioning to a new paradigm, based on SK, highlights the necessity of prioritizing economic and social feasibility of the technological innovation, which implies the adaptation of IK to the requirements by international collaboration (O'Donoghue et al., 2018). These approaches are essential for cultivating a KM based agriculture capable of addressing the challenges posed by climate change and enhancing agricultural production.



Figure 2. Map of Kakara village in Cox's Bazar District (Source: Wikipedia).

4.2. Data Collection and Methodology

This research adopts formal fieldwork with participatory survey methods. Data was collected through an ad hoc designed questionnaire with full engagement of the researcher. A self-administrated questionnaire was provided to the sample of respondents for answering question through "informal unstructured interview" method termed as "conversation with a purpose" (Burgess, 1984: 102). Informants of the study were selected irrespective of age, education, religion

and gender. Stated sample respondents were selected through a pilot study on the population whomever mostly are farmers, bestowing to the objectives of this research. This population is mostly engaged in the agricultural sector (farming stakeholders). To ensure the representativeness of the population, the researcher has selected the interviewees as people involved in the agricultural economy, i.e., acting as farmers, buyers or suppliers of farmers. A total of 200 full completed questionnaires were compiled in the period of April 2023 – October 2023. The questionnaire (fully reported in the appendix) investigated both demographic characters of the respondents and their KM intention (i.e., a recollection of the respondent's motivation to incorporate IK and SK as tools for KM). The first section of the questionnaire specifically controlled the demographic characters: age, gender, marital status, education, work experience and informants' category (whether farmer, supplier or buyer); the constructs to build the five latent variables of interest (i.e. AKI, BITKM, ATK, SNTK and PBC) were incorporated in the second part of the questionnaire. The first part of the questionnaire adopted nominal and numerical scales, whereas the second part employed a Likert scale, ranging from "strongly disagree" to "strongly agree". The statistical problem of severe skewness was ameliorated by the use a five-point scale (Fornell & Yi, 1992).

A description of the demographic characters of respondents is available in Table 2. As expected anywhere else in the world, considering that the target is the agricultural sector (Heggem, 2014), most of the interviewees are male, married with only primary education[16] (Munshi, 2023). They are mostly (35%) aged 36 to 40, representing a relevant proportion of middle-aged village people involved in the farming economy, who are sharing their knowledge and practices reciprocally for maintaining the KM circle. They mostly are farmers (about 78%) with 16 or more years of work experience (64%).

Once collected, data were elaborated by means of partial least-square structural equation method (PLS-SEM), which is well suited for small sample sizes and few statistical parameters (Das and Hasan, 2022; Hair et al., 2011; Wynne, 1998). The analysis was conducted using SMART PLS 4.0 software. As shown in Table 3, reliability was assessed using both Cronbach's alpha and composite reliability (Alyoubi et al., 2018), whereas convergent and discriminant validity were verified by applying the Fornell-Larcker standards. In addition, to establish the significance of the proposed research hypothesis for a path model, the bootstrapping method was applied to merge an

[16] https://liveprod.worldbank.org/en/indicator/sl-tlf-zs?view=bar&gender=total

arbitrary re-sample of the primary data set for the elaboration of new samples of identical sizes, like the present data arrays (Wynne, 1998). Finally, structural relationships were examined at a 0.05 significance level, operating a non-parametric bootstrapping technique that also generated approximate t-value for testing the importance of the structural path (Sanchez et al., 2021).

5. Results

According to the administered questionnaire, most respondence

Table 2. Demographic profile of respondents (*n*=200)

Variable	**Classifications**	**Frequencies**	**Percentages %**
Age	20-25	12	06
	26-30	35	17.5
	31-35	40	20
	36-40	70	35
	41-45	20	10
	46-50	15	7.5
	More than 50	8	04
Gender	Male	170	85
	Female	30	15
Marital Status	Married	180	90
	Unmarried	20	10
Education Level	Primary level	80	40
	Secondary School Certificate (SSC)	50	25
	Higher Secondary School Certificate (HSC)	35	17.5
	Bachelor	20	10
	Masters	15	7.5
Informants Category	Farmer	155	77.5
	Supplier	25	12.5
	Buyers	30	15
Working Experiences	1-5	12	06
	6-10	18	09
	11-15	42	21
	16-20	75	37.5
	More than 20	53	26.5

Table 3 reports the reliability and validity analysis. The findings reveal satisfactory factor loadings, and no indicator displays values lower than 0.76. Cronbach's alpha and the composite reliability for each construct are above 0.7, suggesting good reliability of the model (Taber, 2017). Similarly, all average variance extracted (AVE) values are larger than 0.5 demonstrating convergent validity. Moreover, each latent construct has a squared root of AVE greater than its latent factor correlation, proving that the ranged AVE values of all constructs are far above the minimum threshold value, thus establishing discriminant validity (Zait and Bertea, 2011). Finally, as suggested by Hair et al., (2011), the latent variable correlation off-diagonal values are smaller than the diagonal values (Table 4), suggesting that both analyses are significant and appropriate for addressing the study hypotheses.

Table 3. Results of the reliability and validity analyses

Construct	Items	Factor loadings	Cronbach's alpha (α)	Composite reliability (CR)	Average variance extracted (AVE)
ATK	ATK1 ATK2 ATK3 ATK4	0.773 0.778 0.904 0.896	0.860	0.880	0.706
SNTK	SNTK1 SNTK2 SNTK3 SNTK4	0.787 0.785 0.766 0.780	0.785	0.788	0.608
PBC	PBC1 PBC2 PBC3 PBC4	0.770 0.826 0.833 0.778	0.816	0.824	0.644
BITKM	BITKM1 BITKM2 BITKM3 BITKM4	0.824 0.840 0.827 0.839	0.852	0.853	0.693
AKI	AKI1 AKI2 AKI3 AKI4	0.850 0.782 0.839 0.814	0.839	0.843	0.675

Table 4. Fornell-Larcker discriminant validity criterion

	AKI	ATK	BITKM	PBC	SNTK
AKI	**0.822**				
ATK	0.800	**0.840**			
BITKM	0.819	0.743	**0.832**		
PBC	0.748	0.765	0.720	**0.802**	
SNTK	0.752	0.703	0.739	0.597	**0.780**

Table 5 reports the standardized path (β-value) and ρ-values. The structural model assessment reveals significant relations among independent variables (i.e., factors influencing intention to integrate IK and SK as tools for KM): the ATK, SNTK and PBC coefficient are all positive and statistically significant at the 1% level. In other words, the path between variables indicated that the latent variables are strongly and positively associated, and all presumed hypotheses were achieved and supported. In particular, the highest influence (among the independent variables) was found for SNTK, with coefficient 0.4, followed by the PBC (0.309) and ATK (0.231). On the other hand, between dependent variables (BITKM and AKI), BITKM acting as a mediatory variable strongly influence ATK with coefficient 0.8.

Table 5. Path analysis to test the hypotheses (source: own elaboration)

Hypothesis	Path	Coefficient β	*t* -test value	*p*- value	Status
H1	ATK – BITKM	0.231	3.003	0.003	Supported
H2	SNTK -BITKM	0.392	6.140	0.000	Supported
H3	PBC – BITKM	0.309	4.204	0.000	Supported
H4	BITKM - AKI	0.819	28.083	0.000	Supported

As reported in Figure 3, among the independent variables, the highest values concerning ATK were obtained for the factor loadings of ATK3 (i.e., IK can be used as a technological source of knowledge.) and ATK4 (i.e., Only SK can ensure agricultural sustainability.). This implies that farmers and other stakeholders were psychologically and behaviorally motivated that IK could also be a technical knowledge as SK and it had to be considered within the KM. Accordingly, the significant factor loadings of other independent variable PBC were PBC3 (i.e., use of IK can ensure ecological balance and sustain environmental stability) and PBC2 (i.e., use of SK can ensure food

demands and crop diversification.). On the one hand, this indicates that IK is ecofriendly and thus ensures sustainability. On the other hand, SK invented variety, thus contributing to the food supply and security. Therefore, the combination of IK and SK with proper KM can ensure sustainability. The highest value of factor loadings concerning independent variable SNTK, accordingly SNTK1 and SNTK2, revealed that the stakeholders were determined to use a KM for an effective use of knowledge integration for achieving agricultural sustainability.

Finally, the adjusted R^2 value between the independent variables and the dependent latent variable BITKM, suggested that the variables can jointly explain 69% of the overall variance in BITKM; moreover, its mediating role with the final latent dependent variable KI is explained at 68% R^2 value. Overall, the tested structural model shows interesting results, implying a significant and pivotal impact among the structured relations analyzed throughout the research model.

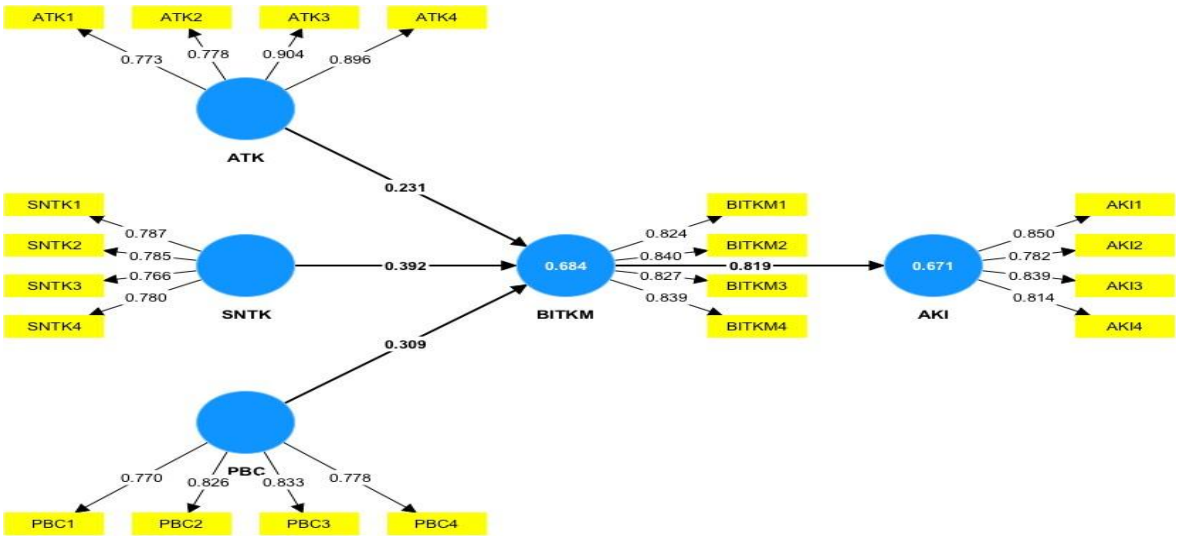


Figure 3. Indicators loadings

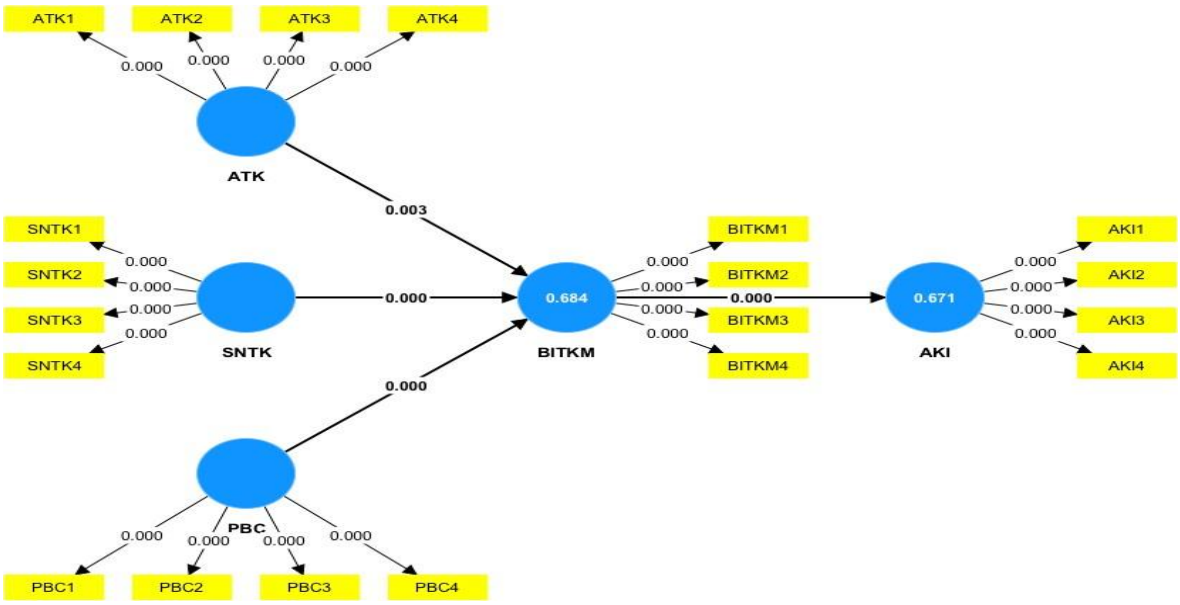


Figure 4. Bootstrapping

6. Discussion

This research used the TPB model to evaluate what influences the KM decisions of farmers in rural Bangladesh when dealing with IK *vs.* SK in agricultural knowledge integration. The findings indicate that motivational factors, i.e., attitudes, perceived behavioral control and subjective norms (respectively: ATK, PBC, and SNTK) primarily influenced the rural people's intention to utilize the KM (BIKM).

When it comes to attitude toward knowledge (ATK), the desire to use an integrated knowledge system is psychologically shaped by factors related to sharing knowledge and the lack of an integrated knowledge model. On the one hand, the difficulties in building an integrated model of IK and SK in agriculture hinder productivity in a sustainable way, and on the other hand, it is

difficult to create an appropriate model that includes capacities and infrastructural deficiencies. The current research reflects the human intention to implement KM that enhances agricultural knowledge sharing practices and establishes a suitable integration system that appropriately involves both IK and SK under one sole framework. The structural equation modeling results in this research represent such a relationship among the prerequisites for both IK and SK, aimed at building a suitable KM. Thus, the inclusion of both IK and SK in the KM, that is considered as technical as SK, psychologically and behaviorally motivates farmers and other stakeholders.

In general, the results of the structural assessment reveal a significant relationship among the independent variables with a satisfactory coefficient value (all positive) and statistical significance. According to the assessment, the most influential variable is SNTK, and the other variables were also significantly associated with each other. This suggests that the factors with the highest loadings in the SNTK variable underscore the critical need for a suitable KM that integrates both IK and SK to ensure agricultural sustainability. The combination of knowledge within an appropriate model is thus an indication for the proper management of knowledge in an agricultural context.

7. Conclusions

This study advances both anthropology and knowledge management (KM) by addressing gaps in prior research concerning the integration of IK and SK within sustainable agricultural practices. Unlike traditional studies that treat these knowledge systems as isolated or hierarchically positioned, this research underscores their potential synergy within a unified KM framework, where IK and SK are viewed as complementary sources of insight. This approach stands out from prior anthropological work, which often either romanticizes IK as a static body of traditional beliefs or critiques it in opposition to SK, seen as empirical and universally applicable (Nonaka & Takeuchi, 1995; Mazzocchi, 2006; Odora Hoppers, 2005). Here, the study expands on this view by revealing IK as a dynamic, context-responsive knowledge system capable of incorporating scientific advancements without losing its cultural specificity. This reframing of IK, which is not merely a relic of cultural heritage but a vital, adaptive component of sustainable practice, addresses a critical gap in the literature about how indigenous communities incorporate external knowledge

within their traditional frameworks (Grenier, 1998; Horsthemke, 2008), and it is now in the compelling agenda of the international agencies[ii].

In the KM literature, the study presents a novel contribution by challenging the traditional emphasis on explicit, formalized knowledge, which aligns with SK's codified and systematic nature. Prior KM research has often struggled to integrate the tacit, experiential nature of IK, viewing it as difficult to formalize and thus less applicable within KM strategies (Lwoga et al., 2010; Polanyi, 1962). This study overcomes this limitation by proposing a KM strategy that treats IK as a legitimate and valuable form of knowledge that can enhance sustainable agricultural practices, especially where environmental adaptability and local ecological insights are crucial. By validating IK's role in environmental stewardship, the study demonstrates that KM can expand to include tacit knowledge forms, bridging the gap between local practices and global sustainability objectives in ways previous KM studies have not fully addressed (Nonaka et al., 2000; Siebers, 2003). The integration is particularly important given that IK provides context-sensitive solutions that scientific models alone may not capture, offering a more inclusive approach to KM for sustainable practices (Agyemang et al., 2019).

Another key addition this study makes, compared to prior research, is its emphasis on participatory approaches that include local stakeholders as active contributors to the KM process. Unlike much of the existing KM and development literature, which often assumes a top-down dissemination of SK, this study advocates for a collaborative model in which IK holders are directly involved in the knowledge creation and implementation process (Escobar, 1995; Purcell, 1998). This bottom-up approach aligns with anthropological methods prioritizing local voices and respect for indigenous perspectives, highlighting the value of participatory KM strategies that allow local communities to inform and shape their sustainable development. This emphasis offers a robust alternative to conventional KM, which can be overly hierarchical and technocratic, and highlights the need for inclusive frameworks that account for the socio-cultural realities of knowledge users (Hakken, 2003).

The research also makes an empirical contribution by providing a case study on a rural community in Bangladesh, illustrating the practical viability and relevance of combining IK with SK. Unlike studies that remain theoretical or focus on generalized concepts, this research provides concrete evidence of how IK can be harnessed within KM to address local agricultural challenges

while meeting broader sustainability goals. The findings reveal that local stakeholders in Bangladesh perceive IK as a legitimate and technically viable approach, motivating them to integrate it with SK under a KM framework (Siebers, 2003). This insight differs from prior research that often reports a resistance to or skepticism of IK among development professionals. Here, the study shows that, given an enabling KM structure, communities are receptive to integrating IK with SK to contribute to sustainable development (Onyeneke et al., 2018).

Finally, the study highlights the cognitive and behavioral motivations of local stakeholders to engage with IK, particularly concerning ecological sustainability. Previous literature has often relegated IK to a passive role, assuming communities would only adopt SK-driven practices. This study contradicts that assumption, showing that stakeholders value the environmental and cultural dimensions of IK, viewing it as essential to achieving sustainability and ecological balance (Danielson et al., 2014; Sillitoe & Marzano, 2009). This analysis shows how KM can support IK-SK integration in a way that is psychologically and culturally affirming for local communities, promoting resilience and innovation within KM frameworks. By positioning IK as a core asset within KM rather than a peripheral addition, the study establishes a precedent for future research to consider IK-SK partnerships as a mainstream approach to sustainable development and KM. This integrative KM approach ultimately fills a critical gap in prior literature, showing how IK and SK can work symbiotically within KM, supporting sustainability in ways that are responsive to both local and global needs (Fullwood & Rowley, 2017; Coleman, 1988)

This research contributes to policymaking by offering a practical, evidence-based framework for integrating IK and SK within development strategies, which could reshape national and international policies towards more inclusive, sustainable development. By empirically demonstrating how local communities can harmonize IK with SK to address agricultural and environmental challenges, this study highlights the limitations of one-size-fits-all, SK-dominant approaches commonly employed in development projects.

For national policymakers, the research emphasizes the need for policies that validate and formalize IK within the KM frameworks, creating a foundation for sustainable local practices that can complement scientific innovations. International agencies, particularly those funding pro-development interventions, are encouraged to consider locally embedded KM that leverage IK, fostering policies that respect cultural context, enhance community engagement, and promote

knowledge-sharing mechanisms. Such an inclusive approach could make development interventions more adaptable to regional needs, increasing their relevance and efficacy in underdeveloped areas, like Bangladesh.

Ultimately, this integrative approach could guide policy toward a collaborative model of knowledge co-creation, promoting a future where IK is recognized as a vital resource in addressing global sustainability challenges while empowering local communities as co-partners in development.

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Appendix

Survey Questionnaire

Part-A (Personal Information)

1. Gender: [A] Male [B] Female
2. Age (years): [a] 20 - 25 [b] 26-30
   [c] 31-35
   [d] 36-40
   [e] 41-45
   [f] 46-50
   [g] more then 51
3. Informants Categories: [A] Farmers
   [B] Suppliers
   [C] Buyer's
4. Your highest educational achievement: [A]Bachelor [B] Masters [C] Other (.....)
5. Name of the Farm/Organization: ……
6. Total working experience (in years): [A] 1-5
   [B] 6-10
   [C] 11-15
   [D] 16-20
   [E] More than 20 years

Part-B

A.	**Attitude Towards Knowledge (ATK)**	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
1.	Do you believe that the lake of an integrated knowledge management system is the main pitfalls of agricultural sustainability in Bangladesh?					
2.	Do you believe that the incorporation of IK and SK can improve agricultural practice and contribute to sustainability?					
3.	Do you believe that traditional knowledge can be used as a technological source of knowledge?					
4.	Is scientific knowledge can harmful for environment and eco-system whereas IK is congenial?					
5.	Do you believe that only scientific knowledge can ensure agricultural sustainability?					
6.	Do you believe that both (indigenous and Scientific) knowledge system are opposite in nature?					
B.	**Subjective Norms Towards Knowledge (SNTK)**					
1.	Do you believe that IK is now defied/ineffective source of knowledge in terms of agricultural practice?					
2.	There are more motivational incentives, and infrastructural facilities incentivize for using SK in agricultural practice in present time.					
3.	Have you got any training about the use of or to operate the scientific technology or machineries?					
4.	Training is available to adopt SK in terms of technology or machinery.					
5.	Do you think suppliers and buyers promote SK in terms of agricultural practices?					
C.	**Perceived Behavioral Control (PBC)**					
1.	It is difficult to use IK in agricultural practice because it is an undocumented source of knowledge.					
2.	The use of SK can ensure the satisfaction of food demand and diversification.					
3.	The use of IK can ensure ecological balance and sustain environmental stability.					
4.	The incorporation of IK can contribute for food safety and demand as well as will be a safeguard for environment and eco-system.					

D.	**Behavioral Intention Towards Knowledge Management (BITKM)**	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
1.	KM can be a synthetic model for using knowledge in a systematic way for proper utilization of both knowledge components.					
2.	KM can provide a proper attribution of knowledge and certain definition technicalities of both source of knowledge will provide the components of proficiencies.					
3.	Inclusion of local know-how in the policy, documentation of local expertise, skills and ensure participation of local people in the implementation will strengthen the structure of the model.					
4.	KM can provide innovation, viability and build a comprehensive environment for knowledge exchange between stakeholders.					
5	KM can be an integral platform for establishing interrelationship.					
E.	**Agricultural Knowledge Integration (AKI)**					
1.	KM can be able to unveil the hazards and vulnerabilities as well as the potentialities.					
2.	KM will provide a platform for proper policy implementation.					
3.	The integral module of KM constitutes within the system of a certain agricultural supply chain.					
4.	KM will be an integrated system.					
5.	KM will be a network among the stakeholders in the agricultural system.					

Thanks for your beloved support.

Chapter Four[17]

Factors Determining Migration Intentions in Bangladesh: From Land to Factory

1. Introduction
2. Literature Review
2.1. Determinants of Migration
2.2. Migration in Bangladesh
3. Conceptual Framework: Theory of Planned Behavior
4. Materials and Methods
4.1. Description of the Research Area
4.2. Data Collection and Methodology
5. Results
6. Conclusion

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Factors Determining Migration Intentions in Bangladesh: From Land to Factory

Abstract

This Chapter explores the migration intentions embedded in population movements from rural to urban areas in Bangladesh. In this country, urban-centric development policies have made cities epicentres of commerce and industrialisation, offering significant employment and livelihood opportunities. This rapid transformation has generated several socio-psychological factors that are influencing the willingness of rural populations to migrate to cities for better jobs, lifestyles and services. The present study adopted the theory of planned behaviour as a conceptual model to assess the behavioural and psychological factors underlying migration intentions. The analysis drew on an original dataset built through interviews with migrants from rural areas employed in the ready-made garment industry in four selective areas of the Metropolitan city of Chittagong. The results of the structural equation modelling indicate that migration intentions are mainly influenced by subjective norms and, to a lesser extent, attitudes towards migration and perceived behavioural control.

Keywords: Economic Development; Internal Migration; Urbanisation; RMG Sector, Bangladesh

JEL classification: J61, O15, P25, R23, Z1

1. Introduction

Over the past few decades, many Asian countries have adopted policies to accelerate economic development through rapid urbanisation. Accordingly, the metropolitan context has become the centre of capital accumulation, providing opportunities for large segments of the rural population to engage in substantial domestic migration to urban cities in pursuit of better jobs, wages and living standards (Lall and Selod 2006). The rapid urbanisation has led farmers – and especially young rural labourers – to gradually cease farming activities, generating dramatic demographic imbalances (Celi and Sica 2023).

Against this backdrop, Bangladesh has benefited from a number of development projects in urban centres, fostering unprecedented urban growth and transforming the country into a developing economy (Haider 2010). The relevant urbanisation rate (3% from 1975–2009, representing one of the highest worldwide) reflects the internal migration dynamics, with the country's rural population having doubled between 1960–2018, while the urban population has increased 23-fold (Al-Maruf et al. 2022). In particular, Chittagong – the second largest and main commercial city in Bangladesh – has become a hub for the country's international business and import-export industry. Many ready-made garment (RMG) industries, the Export Processing Zone (EPZ) of Chittagong and the Korean EPZ, as well as other industrial sectors, have sprung up around the city.

Several studies have investigated the factors that have contributed to the increase in rural-to-urban migration in Bangladesh (Al-Maruf et al. 2022; Adkoli 2006). These studies have focused on the economic, social and environmental challenges faced by farmers, especially in terms of the job opportunities offered by the RMG industry (Kartiki 2011; Mottaleb and Sonobe 2011), the possibilities for women and young people to achieve financial independence (Li and Zhang 2020; Salway, Jesmin, and Rahman 2005) and the vulnerability of coastal rural communities to the effects of climate change (World Bank 2016). Other studies have investigated the socio-economic implications of remittance flows (Etzold et al. 2014; Sikder and Ballis 2013; Lein 2000; Finan 2004; Afsar 2003; Giannelli and Canessa 2022).

However, to the best of our knowledge, the individual motivations of Bangladeshi farmers towards urban migration have never been investigated in terms of social-psychological and behavioural factors. The present paper aims at filling this gap in the literature by shedding light on

the behavioural motivations for and environmental influences promoting rural-to-urban migration within Bangladesh. In particular, the present research focuses on the RMG industry. The RMG sector has been the engine of growth for Bangladesh's economy in recent decades. In 2022, this sector alone covered 9.25% of GDP, employing more than 4 million workers, achieving exports of $52 billion, a figure that amounts to over 80% of the country's total export earnings (Bangladesh Bank 2023; Swazan and Das 2022). Indeed, this sector is emblematic of Bangladesh's economic-social transformations, for a number of reasons. For its dynamism and the impetus it has given to the country's overall growth, for its connections with internationalisation processes and for the employment opportunities it offers, also in terms of socio-cultural evolution for vast strata of the population, which has moved from an agrarian and rural condition to urbanised and industrial contexts. These reasons explain why, in the present research, the analysis of the determinants of rural-urban internal migration in Bangladesh has focused on the RMG sector, the industry that, in general, has most represented the modernisation processes in the country. The research employed primary data collected through an ad-hoc questionnaire targeting RMG employees in Chittagong city. The study aimed at identifying farmers' subjective beliefs in migration and how these affected their intentions to migrate. Following the theory of planned behaviour (TPB) (Ajzen 1991), underlying beliefs behind migration intentions were assessed in terms of personal attitudes, subjective norms and perceived behavioural control, and subsequently quantitatively analysed by means of a structural equation model.

The remainder of the paper is structured as follows: the second section presents a literature review on the determinants and effects of migration intentions and discusses the factors that have contributed to increased rural-to-urban migration in Bangladesh. The third section describes the conceptual framework and introduces the research hypotheses. The fourth section introduces the analytical context and empirical methodology. The fifth section discusses the results, and the final section provides some concluding remarks.

2. Literature review

2.1 Determinants of migration

A number of analytical approaches have been applied to address the migration issue, such as: one emerging from modernisation theory (Frank 1967; Wallerstein 1974); another based on a

historical-structuralist/political economy perspective, (Fassin 2011) emphasising the impact of global capitalism; one related to the formation of a "culture of migration" (Cohen 2004); and a more recent approach framed by the concepts of transnationalism (Vertovec 2009) and diaspora (Cohen 2022; Safran 1991).

In particular, in the analysis of migration's determinants, the decision to move is influenced by "pull" and "push" factors (Brettell 2023). More specifically, pull factors include destination-specific motivations, such as better job opportunities and greater real wages (Mayda 2022). In rural-to-urban migration, for instance, the urban job market is perceived to offer more opportunities than subsistence farming, because it can provide the cash required in rural areas to manage bride price, provide a dowry or purchase a house. However, the "trigger price" for migration (i.e. the expected income/advantage differential between the place of origin and the destination) is generally disproportionately larger than the simple monetary cost of relocation, indicating that additional socio-cultural factors besides economic factors are significant pull factors (Coxhead, Nguyen, and Vu 2019). Indeed, some authors have emphasised the socio-psychological motivations of individual migrants. For instance, Du Toit (1990) coined the "bright lights" theory, stressing the attractive role played by urban life excitement for young migrants, and especially young men.

On the other hand, individuals may be pushed to migrate due to specific circumstances generally related to negative home conditions, including unemployment, a lack of job opportunities, limited educational facilities, land shortages and low crop yields (Kebu, Berisso, and Mulugeta 2023). Moreover, unfavourable climatic conditions can make some agricultural areas more vulnerable to drought, floods and other environmental conditions, forcing individuals to migrate (Coxhead, Nguyen, and Vu 2019; Banerjee 2007). Concerning rural-to-urban migration, the most relevant push factors resulting in large-scale migration are inadequate social safety nets, a scarcity of diverse employment opportunities, and/or unexpected natural disasters (Biswas, Kabir, and Khan 2019). Todaro (1969) and Harris (1970) claimed that rural-to-urban migration in less developed countries is determined by the disparity between urban and agricultural wages.

Finally, Brown and Bean (2016) argued that households are often the critical decision-making units, making cost-benefit calculations about whether to move. In this regard, it is noteworthy to observe that households induce labourers to migrate not only to make money in

absolute terms, but also to enhance their income comparatively to other households, and thereby reduce their relative deprivation with respect to certain reference groups (Mincer 1978; Stark and Stark 1991).

2.2 Migration in Bangladesh

Over the last decades, rural-to-urban migration in Bangladesh has increased significantly, in line with the country's economic development (Hossain 2001; Rouf and Jahan 2007). In the past, a vast literature (Biswas, Kabir, and Khan 2019; Elahi 1972; Hussain 1972; Stoeckel, Chowdhury, and Aziz 1972; Chaudhury and Curlin 1975; Chaudhury 1978; Krishnan and Rowe 1978; Begum 1979; Haque 1982) discussed the causes and effects of rural-to-urban migration, focusing on remittance flows, environmental impacts and the migration-development nexus in Bangladesh. However, in recent decades, scholars (Afrad et al. 2020; Al Amin 2010; Finan 2004; Haider 2010; Herrmann and Svarin 2009; Ishtiaque and Ullah 2013; Islam 2013; Karim and Muhammad 2018; Sikder and Ballis 2013; Ullah 2004) have begun to investigate the socio-economic determinants of migration in Bangladesh, concentrating on the rapid urban changes and rural-urban disparities. Afsar (2003) found that rural-to-urban and urban-to-urban migration represented approximately 90% of the total internal migration in Bangladesh. Islam (2013) argued that economic factors are the main reasons why people move to Dhaka and Chittagong (i.e. the largest cities in Bangladesh). Exploring low-income migrants in Rajshahi city, Haider (2010) concluded that natural catastrophes, joblessness and poverty at home were the major contributors to migration. Furthermore, Islam and Siddiqi (2010) described that urban areas provided opportunities for various forms of innovation, technological programmes and cultural activities, which enticed rural individuals to seek out better jobs and working conditions. Besides these opportunities, Giani (2006) proposed the importance of the "bright city lights" effect.

While the socio-economic determinants of internal migration in Bangladesh have been largely explored, individual attitudes towards migration in terms of subjective norms, social-psychological conditionings and behavioural drivers have received very little attention from researchers. The present paper aimed at filling this gap.

3. Conceptual Framework: Theory of Planned Behaviour

Since the early 1980s, academic debate has been polarised over migration, positioning neo-classical perspectives against historical-structuralist frameworks (i.e. neo-Marxist, dependency, world systems) (De Haas 2010). However, both of these theoretical perspectives have failed to provide a general model for why some individuals migrate while others do not, and why migration flows follow non-random patterns (Massey et al. 1993). Specifically, neo-classical theory presumes that individuals are rational agents who make migration decisions to maximise their income or "utility", based on perfect information about wage levels and employment possibilities (which is unlikely in the real world) (Jin et al. 2022).

More recently, a number of researchers (Dinkelman and Schulhofer-Wohl 2015; Karbasi, Fahimi-Fard, and Jahany 2011; Trell, van Hoven, and Huigen 2012) have provided significant insights into the socio-demographic and socio-cultural impacts of migration, albeit they have paid little attention to the behavioural and psychological dimensions of migration intention. In this regard, Thissen et al. (2010) claimed that the migration decisions of rural individuals must be understood within the social and cultural context of the family, community, region and nation-state, which may affect residents' attitudes and behaviours. Therefore, migration intentions may be shaped by social forces and directly affected by behavioural constraints and facilitating factors (De Jong 2000).

Starting from these premises, the present study employed a social-psychological model, rooted in the theory of planned behaviour (TPB) proposed by Ajzen (1991), to examine the factors influencing migration intention. TPB represents a significant social cognitive paradigm that was developed with the aim of explaining variation in volitional behaviour (Yazdan-Panah and Zobeidi 2017). According to TPB, the main factor for determining behaviour is the intention to behave, which is associated with the likelihood that an individual will perform the given behaviour. Ajzen described that "*intentions are assumed to capture the motivational factors that influence behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior. As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance*" (1991:181). In this framework, intentions are generally determined by three variables: personal attitudes, subjective norms and perceived behavioural control. This approach can be highly relevant to migration – and especially

internal migration from agricultural and rural areas – since it can adequately predict and explain behaviours associated with migration decisions (Zaremohzzabieh et al. 2022). Although a number of studies (Kley and Mulder 2010; Van Dalen and Henkens 2008, 2013) concluded that migration intentions can be significant indicators of the realisation of migration, the TPB model has rarely been used to assess the intentions and social-psychological factors that influence the decision to migrate.

To explore the application of this approach to the case of rural-to-urban migration in Bangladesh, the present study built a TPB model that explained migration intention (MI) in terms of: (i) individual attitudes, (ii) subjective norms and (iii) perceived behavioural control towards migration. Following Ajzen (2006), the dependent variable (MI) was proxied in terms of the following four statement items: (i) ensuring a better life, (ii) ensuring a better education for children, (iii) enabling better recreational facilities and (iv) ensuring a more secure life. The three aforementioned independent variables were proxied as follows:

1. Attitude towards migration (ATM): Attitudes generally represent tendencies to react positively or negatively to an issue, person, organisation or occurrence (Ajzen 2006). De Jong (2000) identified attitudes as valued objectives that assist in defining migration motivations. ATM, in particular, can be conceived of as an individual's positive or negative evaluation of the behaviour of becoming a migrant. To measure ATM among rural individuals, the present study used four statement items: (i) "bright lights" (urban) influence, (ii) modern lifestyle, (iii) RMG sector influence and (iv) satisfactory wages.
2. Subjective norms (SN): Subjective norms comprise the social pressure exerted on individuals, leading them to execute or refrain from particular actions under specific conditions (Ajzen 2006). In the present study, SN referred to an individual's beliefs or perceptions that pushed them to comply with the directions, recommendations or requests made by others (i.e. social pressure) and motivated them to become (or not) a migrant. To measure the SN behind migration intention, the present study singled out four influential statement items: (i) social network, (ii) urban job as socially more dignified, (iii) elevation of poor family conditions and (iv) social barriers for women working in villages.
3. Perceived behavioural control (PBC): PBC can be conceived of as an individual's impression of the difficulty or ease with which a particular behaviour can be performed (Ajzen 2006). PBC

is influenced by several factors, including the individual's skills, resources, opportunities and prior experiences performing similar behaviour. It is also influenced by external factors, including the availability of social support or the presence of impediments, which facilitate or impede the behaviour, respectively. Accordingly, the present research linked individuals' views of the difficulty or ease with which they could perform certain behaviours to migration desire by measuring PBC, in terms of the following four statement items: (i) relative ease of accessing job opportunities, (ii) relative ease of accessing career opportunities, (iii) relative ease of achieving individual freedom and (iv) relative profitability of agricultural activity.

Information shown in Table 1 summarises the statement items that informed the TPB model.

Table 1. Construct dimension and related statement items (source: own elaboration)

Construct dimension	**Items**
Dependent variable	
Migration intention (MI)	MI1 – Ensuring a better life MI2 – Ensuring a better education for children MI3 – Enabling better recreational facilities MI4 – Ensuring a more secure life
Independent variables	
Attitude towards migration (ATM)	ATM1 – "Bright lights" (urban) influence ATM2 – Modern lifestyle ATM3 – RMG sector influence ATM4 – Satisfactory wages
Subjective norms (SN)	SN1 – Social network SN2 – Urban job as socially more dignified SN3 – Elevation of poor family conditions SN4 – Social barriers for women working in villages
Perceived behavioural control (PBC)	PBC1 – Relative ease of accessing job opportunities

	PBC2 – Relative ease of accessing career opportunities PBC3 – Relative ease of achieving individual freedom PBC4 – Relative profitability of agricultural activity

In light of this, the following research hypotheses were proposed (Figure 1):

H1. Migration intention would be significantly associated with ATM.

H2. Migration intention would be significantly associated with SN.

H3. Migration intention would be significantly associated with PBC.

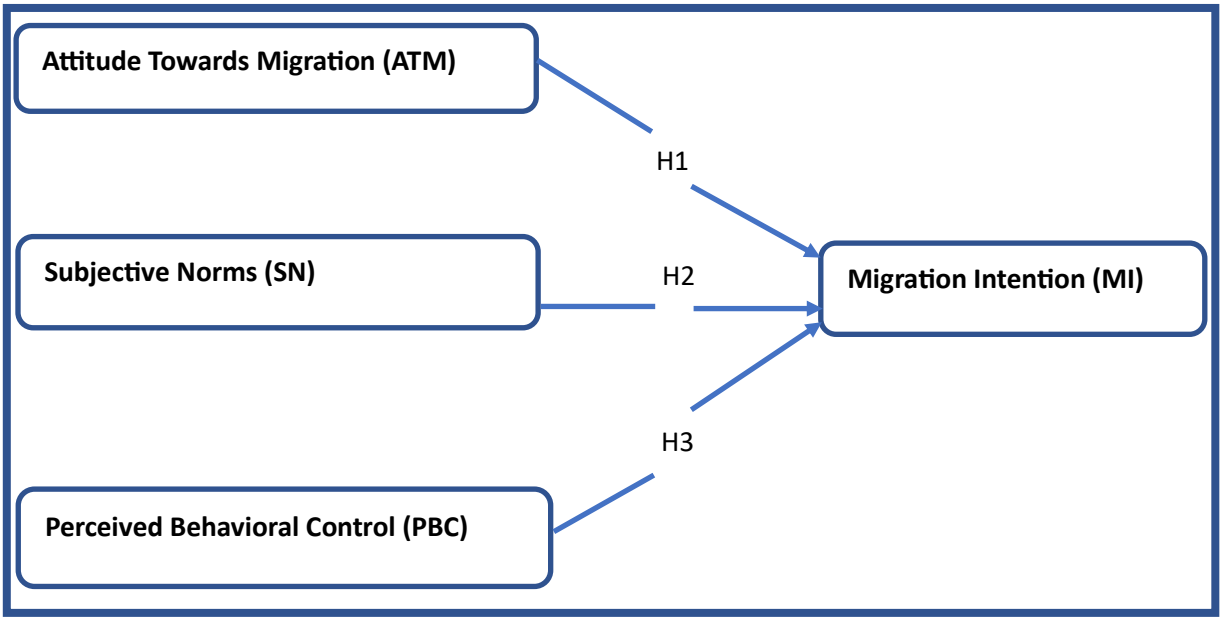


Figure 1. Research framework (source: own elaboration)

4. Materials and methods

4.1. Description of the research area

The present study investigated the case of Chittagong city – the second largest division of Bangladesh – situated in the southeastern part of the country, on the bank of the Karnaphuli River. The city represents the manufacturing centre of Bangladesh, and its economic contribution is particularly important due to the presence of the country's largest seaport, which controls almost 80% of all national imports and exports. Chittagong city covers an area of approximately 1,152 square km, with 11 metropolitans *Thanas* (i.e. police stations), 41 *Wards* and 238 *Mahallas* (i.e. localities). The present study focused on Chittagong City Corporation (CCC) – an area of Chittagong city covering 161 square km (BBS 2015) (Figure 2).

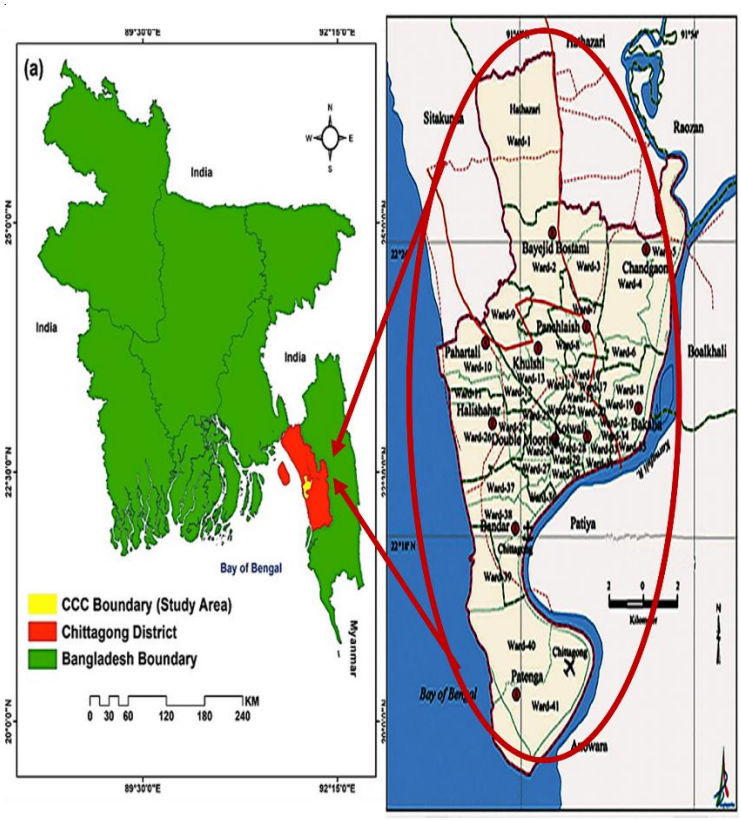


Figure 2. The area of Chittagong City Corporation (source: Wikipedia)

While in 1863, the population of Chittagong city amounted to 25,000, it is now home to more than 5 million, and shows 2% growth per annum (United Nations 2019). The average population density per square km was more than 18,000 in 2017 (DESA - United Nations 2018). According to IMF poverty reduction strategy data, the city municipality had more than 18,114 slums with more than 1.8 million residents in 2013, ranking it the second largest city in the country in these terms, after the capital city of Dhaka (IMF 2013). As a main commercial and industrial hub, Chittagong city is the second target of migrants (after Dhaka) from surrounding rural areas (NIPORT 2015).

The present study was conducted in four *Thanas* of CCC: Bandar, Panchalish, Bayezid Bostami and Chandgaon (Figure 3).

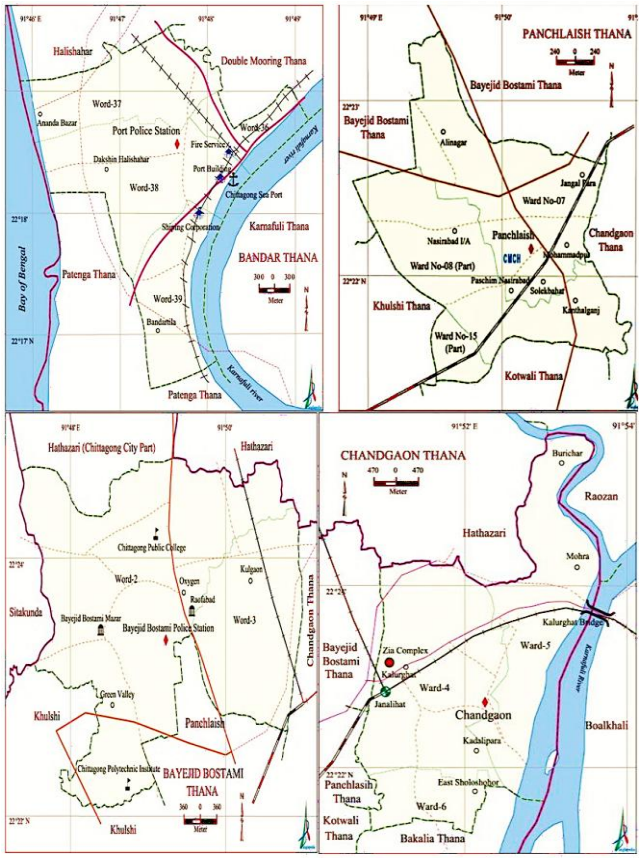


Figure 3. Map of the four investigated CCC *thanas*

To capture the dynamic image of rural-to-urban migration and post-migration experiences, the targeted population was represented by workers and employees in the RMG sector who migrated from the surrounding villages.

4.2. Data collection and methodology

Data were collected through an *ad hoc* questionnaire. Under the supervision of the Authors, three research assistants administered the questionnaire by going personally to the main RMGs factories in the area under investigation. To ensure representativeness, the sample was stratified by reaching workers living in each of the four aforementioned *Thanas* and who migrated from the adjacent rural areas. Respondents were selected irrespective of age, education and religion, but equally divided by gender. A pilot questionnaire was launched in September 2021 with a limited number of respondents (20). This allowed us to fix any possible problem related to the misspecification of questions and, at the same time, to simplify the overall structure of the questionnaire, whose final version was administered from November 2021 to October 2022.

The questionnaire (fully reported in the Appendix) investigated both demographic factors (e.g. age, occupation) and attitudes (e.g. respondents' recollections of their motivations to migrate, comparison of their lives before and after migration, and observations of changes in their places of origin preceding their migration). More specifically, age, gender, education, marital status and family income were integrated in the initial section of the questionnaire, whereas the four variables of interest (i.e. MI, ATM, SN, PBC) were incorporated in the second part of the questionnaire. The first part of the questionnaire adopted nominal and numerical scales, whereas the second part employed a five-point Likert scale, ranging from "strongly disagree" to "strongly agree". The statistical problem of severe skewness was ameliorated by the use of a five-point measure scale (Fornell and Yi 1992). In order to assess the reliability of the responses, a cross-check of the interviewees' insights was conducted by looking at the consistency of specific answers[18]. A total of 300 fully consistent questionnaires were compiled (i.e. 75 for each *Thana*).

[18] As, for instance, between answers to questions 2.5 and 4.1, and between answers to questions 3.5 and 4.3.

Due to the complexity of the factors affecting migration intention, collected data were elaborated by means of the partial least-square structural equation (PLS-SEM) method. Based on an iterative approach that maximizes the explained variance of endogenous constructs, PLS-SEM has recently gained considerable attention in social sciences due to its ability to handle complex models with many constructs, structural paths and indicator variables (Hair et al. 2019). The method allows, indeed, to provide causality interpretation between variables by taking into account the possible existence of indirect effects arising from other variables. Accordingly, it looks particularly suitable to address the research question and the proposed conceptual framework, which is based on the existence of hypothesised constructs and statement items. Furthermore, PLS-SEM exhibits at least two other strengths. First, it allows to achieve high levels of statistical power without imposing any distributional assumption on the data (Das and Hassan 2022; Hair, Ringle, and Sarstedt 2011). Second, it does not require the specification of goodness-of-fit metrics since the model's assessment relies on a different set of indices, such as construct reliability and validity (Hair and Alamer 2022). At regards, to take into account the varying factor loadings of the items, reliability was assessed using both Cronbach's alpha and composite reliability indices (Alyoubi et al. 2018), whereas convergent and discriminant validities were verified by applying the Fornell-Larcker standards which compares the square root of the average variance extracted (AVE) with the correlation of latent constructs (Ab Hamid, Sami, and Sidek 2017). In addition, to establish the significance of the proposed research hypotheses for a path model, the bootstrapping method was applied to merge an arbitrary re-sample of the primary data set for the elaboration of new samples of identical sizes, like the present data arrays (Wynne 1998). Finally, structural relationships were examined at a 0.05 significance level, operating a non-parametric bootstrapping technique that also generated approximate t-values for testing the importance of the structural path (Sanchez et al. 2021).

5. Results

According to the administered questionnaire, most of the respondents (45.0%) were aged between 18–26 years (Table 2), representing a significant and active portion of the labour force displaced from the rural agricultural sector to urban non-agricultural sectors. This was an expected result, since migration is an age-selective process, with young adults generally representing the

most mobile group (Charles-Edwards et al. 2019). Furthermore, the migration rate was higher for individuals with a low (i.e. 0–primary) educational qualification (60.7%) and an average family income between 91-136$ (57.3%). This suggests that CCC creates many employment opportunities in the RMG sector for young labourers with minimal educational qualifications.

Table 2. Demographic profile of respondents (n = 300)

Variable	**Classifications**	**Frequencies**	**Percentages**
Age (mean age 27.1 years)	< 26	135	45
	< 36	115	38.3
	< 46	39	13
	< 56	08	2.7
	< 65	02	0.67
	> 65	01	0.33
Gender	Male	150	50
	Female	150	50
Education	Primary level	182	60.7
	Secondary school certificate (SSC)	59	19.7
	Higher secondary school certificate (HSC)	25	8.3
	Bachelor	25	8.3
	Masters	09	3
Marital status	Married	204	68
	Unmarried	96	32
Family income	< 10k	68	22.7
	< 15k	172	57.3
	< 20k	42	14
	< 25k	14	4.7
	> 25k	04	1.3

Table 3 reports the results of the reliability and validity analyses. The analysis was conducted using SMARTPLS 4.0 software. The findings reveal satisfactory factor loadings, and no indicator display values lower than 0.75. Cronbach's alpha and the composite reliability for each construct were above 0.7, suggesting good reliability of the model (Taber 2018). Similarly, all average variance extracted (AVE) values were larger than 0.5, demonstrating convergent validity. Moreover, each latent construct had a squared root of AVE greater than its latent factor correlation, proving that the ranged AVE values of all constructs were far above the minimum

threshold value, thus establishing discriminant validity (Zaiţ and Bertea 2011). Finally, as suggested by Hair, Ringle, and Sarstedt (2011), the latent variable correlation off-diagonal values were smaller than the diagonal values (Table 4), suggesting that both analyses were significant and appropriate for addressing the study hypotheses.

Table 3. Findings on the reliability and validity analyses

Construct	**Items**	**Factor loadings**	**Cronbach's alpha (α)**	**Composite reliability (CR)**	**Average variance extracted (AVE)**
ATM	ATM1 ATM2 ATM3 ATM4	0.799 0.755 0.897 0.889	0.873	0.856	0.701
SN	SN1 SN2 SN3 SN4	0.799 0.780 0.782 0.776	0.797	0.792	0.615
PBC	PBC1 PBC2 PBC3 PBC4	0.767 0.836 0.834 0.788	0.827	0.821	0.651
MI	MI1 MI2 MI3 MI4	0.788 0.819 0.823 0.824	0.830	0.830	0.662

Table 4. Calculation of the Fornell-Larcker discriminant validity criterion

	MI	**ATM**	**SN**	**PBC**
MI	**0.814**			
ATM	0.792	**0.837**		
SN	0.773	0.717	**0.784**	
PBC	0.763	0.777	0.634	**0.807**

Table 5 reports the standardised path (β-values) and *p*-values. The structural model assessment revealed significant relations among variables (i.e. factors influencing migration

decisions): the ATM, SN and PBC coefficients were all positive and statistically significant at the 1% level. In other words, the path between variables indicated that the relationships were strongly and positively associated, and all presumed hypotheses were achieved and supported. In particular, the highest influence was found for SN, with a coefficient of 0.38, followed by PBC (0.30) and ATM (0.29).

Table 5. Path analysis to test the hypotheses (source: own elaboration)

Hypothesis	Path	Coefficient (β)	t-test value	*p*-value	Status
H1	ATM→MI	0.289	4.525	0.00	Supported
H2	PBC→MI	0.300	4.978	0.00	Supported
H3	SN→MI	0.376	8.669	0.00	Supported

As reported in Figure 4, the highest values concerning SN were obtained for the factor loadings of SN2 (i.e. urban job as socially more dignified) and SN3 (elevation of poor family conditions). This implies that having a job in an urban area was considered more socially prestigious than agricultural labour in a rural area, thereby presenting a psychological motivation to migrate. Accordingly, the factor loadings of ATM3 (i.e. RMG sector influence) and ATM4 (i.e. satisfactory wages) were also influential, indicating that the RMG sector offered jobs that paid satisfactory wages with minimal educational requirements, thereby attracting rural labourers. Seemingly, the factor loadings of PBC2 (i.e. relative ease of career opportunities) and PBC3 (i.e. relative ease of achieving individual freedom) posited a strong behavioural influence in support of migration. Finally, the adjusted R^2 value suggests that the variables jointly explained 75.0% of the overall variance in MI, demonstrating the good predictive power of the model. Overall, the tested structural model showed good results with a significant and pivotal impact among the analysed structured relations.

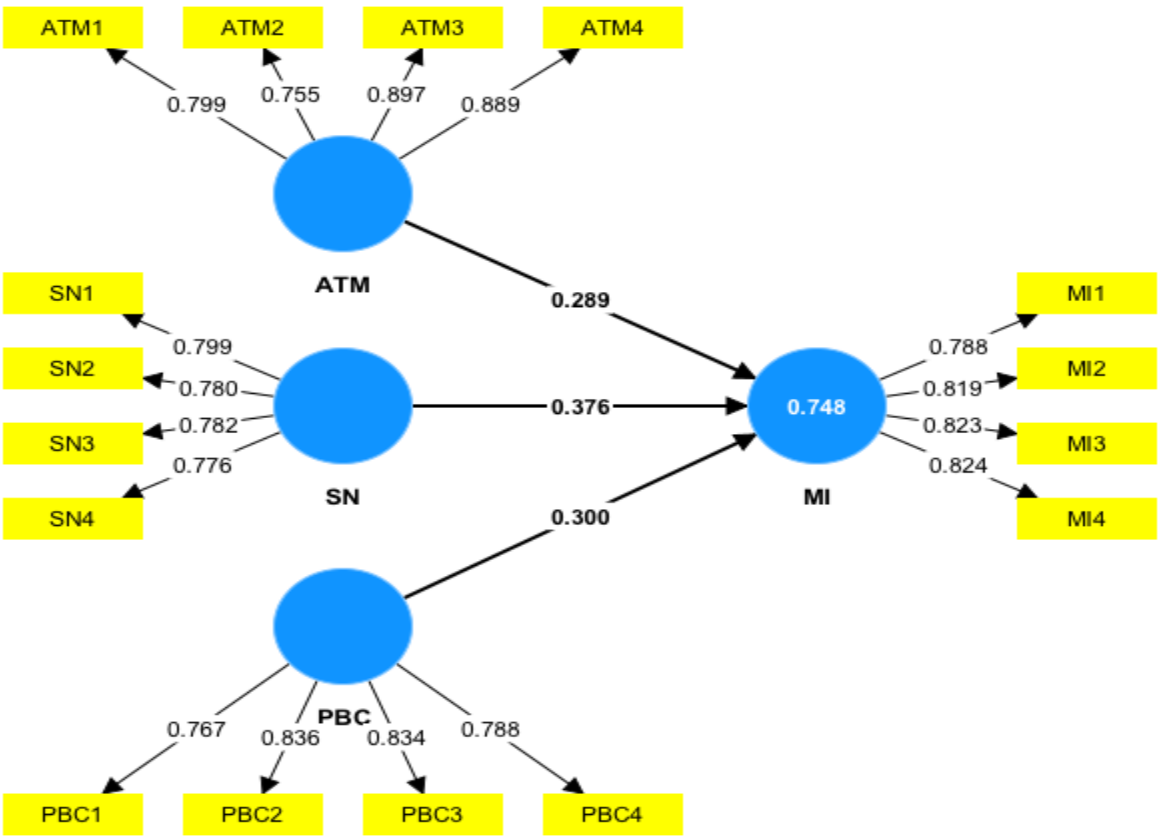


Figure 4. Indicators loadings

6. Conclusions

The present study employed the TPB model to assess the incumbent factors influencing the behaviour of rural migrants in Bangladesh to undertake a migration decision. The results show that the intention of rural people to migrate was mostly influenced by subjective norms followed by perceived behavioural control and attitude towards migration. With reference to subjective (social) norms, a combination of economic factors and cultural influences shaped willingness to migrate. On the one hand, the opportunity to escape difficult economic conditions in one's village of origin was a strong socially recognised incentive to undertake migration. On the other hand, other factors that were not strictly economic significantly impacted the intention to migrate: access to a job that was considered culturally more dignified than rural work; socio-cultural support networks that were sympathetic to migrants in the destination; and the attractiveness to women of urban working

conditions as a way of overcoming social barriers to work in one's village of origin. Factors associated with individual attitude towards migration were also relevant, combining cultural and economic elements. The very young average age of respondents may contribute to explaining the significant role of the "bright lights" effect exerted by the city and its imagery (related to modern lifestyles). Finally, explanatory factors associated with perceived behavioural control involved a weighing of the advantages and disadvantages of migrating, expressed in terms of the ease/difficulty with which individuals perceived they would be able to achieve certain goals. Although this comparative process approached the logic of rational choice (associated with the neo-classical model), it did not involve an actual economic calculation, but a "perception" of the relative ease/difficulty of achieving certain interlinked targets, including job and career opportunities, individual freedom and relative economic improvement compared to farming. However, the present results attribute greater explanatory power to subjective norms variables, which did not involve a rational calculation but were instead based on cultural conditioning. With these factors, the economic element – albeit playing a relevant role – was not dominant but intertwined with other equally important elements.

Overall, the present study shows that the attraction exerted by the perceived opportunities associated with modern urban environments has a strong influence on the psychological motivation to migrate. However, "perception" does not always correspond with a real and correct assessment of the actual opportunities and conditions in the destination. Although migration is, in many cases, an inevitable escape from situations in which economic survival is not guaranteed, ill-founded perceptions and assessments underlying the decision to migrate have a number of knock-on effects. On the one hand, oversized and unplanned migration flows have created congestion in urban destinations, with negative effects for urban liveability and the living and working conditions of migrants, themselves. On the other hand, the massive loss of human and labour resources in rural contexts has had dramatic effects, in both economic terms (e.g. in the sphere of factors affecting productivity) and socio-cultural terms (i.e. weakening the connective matter and generational reproduction of rural communities). In the face of these imbalances, the challenges for policymakers are far from easy, as the experiences of other Asian countries (e.g. China, Vietnam) demonstrate. Resolute steps should be undertaken to improve the management of internal migration, rethinking the idea that the only development that can be pursued is "urban-centric" – which fuels, as seen, the motivation to migrate, even in its aspects linked to the imagery of the city

– and recovering the perspective of a territorial rebalancing aimed at reducing gaps in job opportunities and income between urban and rural contexts.

While the present work has attempted to highlight the relevant factors behind rural-to-urban migration in Bangladesh, focusing on the Chittagong City Corporation territory, future lines of research may address the impact of migration flows on the rural contexts in which migrants originate. This future research strategy may generate additional knowledge to support a policy of spatial and migration rebalancing in Bangladesh.

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Appendix – The questionnaire

0. Demographic information:

1. Gender

2. Age

3. Marital status

4. Educational status

5. Family income

1. Migration intention (MI)

Questions	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
1. Ensuring a better life					
2. Ensuring a better education for children					
3. Ensuring urban recreational facilities and amenities					
4. Ensuring a more secure life					

2. Attitude towards migration (ATM)

Questions	Strongly	Disagree (2)	Neutral	Agree (4)	Strongly

	disagree (1)		(3)		disagree (5)
1. Current urban facilities and the "bright lights" influence are strong motivational factors to migrate to the city					
2. Life and living are more diversified and colorful in urban areas					
3. Modern lifestyles provide a psychological motivation to migrate to the city					
4. A job in the RMG sector is a top priority for migration to the city					
5. Urban jobs offer satisfactory wages and other facilities					

3. Subjective norms (SN)

Questions	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly disagree (5)
1. Family members/friends working in urban areas influence me to migrate					
2. Working in an urban area is more socially dignified than doing agriculture in the village					
3. I have decided to migrate to improve my living conditions					
4. I have decided to migrate to alleviate the poverty of my family					
5. There are social barriers to women's participation in the workforce in their local village					
6. Technological advancement is more developed in urban areas than in the village					

4. Perceived behavioural control (PBC)

Questions	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)

1. Job opportunities are more available and accessible in urban areas					
2. It is easier to build a career (i.e. there are more career opportunities) in urban areas					
3. Urban lifestyles have the scope for more individual freedom					
4. Now, agriculture is less profitable in the village					
5. Urban life is more secure than village life					
6. Living costs in urban areas are less than those in the village					

Chapter Five

Discussions and reflections: concluding remarks

Indigenous knowledge (IK) is the systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments, and intimate understanding of the environment in a given culture. IK is dynamic, changing through indigenous mechanisms of creativity and innovativeness as well as through contact with other local and international knowledge systems. IK is the actual knowledge of a given population that reflects the experiences based on traditions and includes more recent experiences with modern technologies. Local people, including farmers, landless laborers, women, rural artisans, and cattle rearers, are the custodians of indigenous knowledge systems. These indigenous knowledge systems may appear simple to outsiders, but they represent mechanisms to ensure minimal livelihoods for the rural resource-poor people in Bangladesh.

IK, as a tacit knowledge, is the basis of farmer communities, coping practices that have helped vibrant local people to adapt different practices socially, economically and environmentally, with their conditions. Since the 1980s, IK has been a topic of important discussion among scholars of anthropology, geography and disciplines related to development studies. Today, there is broadening interest from a variety of fields: ecology, soil science, health, medicine, botany, water resource management and finally also by economists and business scientists. The interest is driven by research into sustainable development practices in developing countries and the scientific community's concern over loss of species and ecosystems. Incorporating local knowledge into project activities- such as sustainable agriculture development projects - can reduce the risks associated with relying on non-relevant technology. IK can help promote biodiversity and environmental conservation by applying sound environmental practices that are appropriate for the particular local landscape. In fact, incorporating IK subsystem into conservation and development activities of sustainable agriculture is believed to be an important mechanism for ensuring the most efficient and productive use of natural resources in the short term without jeopardizing the long-term and effective capacity of nature to continue producing these resources.

Yet, IK is often neglected as a key source of policy relevant information because it is often undervalued relative to scientific knowledge (SK), by both non-local project managers and local

communities themselves. Learning about and making use of local knowledge helps confirm the value and importance of such knowledge and facilitates its integration into sustainable agricultural development policies and practices. Although IK was often well adjusted to the prevailing biological, economic, and social conditions, different studies indicated that local IK alone is unlikely to provide all the necessary solutions, given the rapidly changing economic, ecological, and social circumstances of farming systems. Therefore, integration and co-management of indigenous and non-indigenous subsystems toward sustainability is necessary.

The value of indigenous knowledge in advancing agricultural productivity and agro-management systems has lately been acknowledged. This discussion emphasizes the importance of incorporating the knowledge of the target groups for development efforts, instead of presuming the universal application and superiority of scientific knowledge. These approaches seem to present a constructive path forward because: i) they consider the particularities of local conditions; ii) they utilize the insights of individuals with lived experience in the relevant environments; and iii) they grant communities ownership of the development process. Cultural and traditional knowledge are notions that anthropologists have developed and expanded during the past century. These have lately been adopted and utilized in manners unforeseen by anthropologists, occasionally contradicting the facts, theories, and models employed to formulate these notions. Initially, it is accurate to assert that the majority of anthropologists welcomed this attention, with some embracing these appropriations. Globalization is a well-established concept that elucidates the modern reorganization of the industrial, agricultural, and service sectors of the economy, where the establishment and accessibility of global markets for goods and services are frequently considered as prevailing external economic forces influencing the restructuring of regional economies. Globalization, being a comprehensive process of liberalizing ideas, information, goods, culture, communication, human interactions, agencies, markets, and social institutions, has a pervasive influence. Globalization-induced migration, together with push factors like natural catastrophes, can significantly affect rural communities by eroding the social capital embodied in IK. These consequences can go in the opposite direction to sustainable agriculture: intensive farming, labour-saving production techniques, extensive mechanization, and land usage for other reasons beyond food production, etc. Chapter Four examined the impact of globalization - embodied by export processing zones and the garment industry - on internal migration, subsequently influencing social capital and IK in rural regions.

The research also provided an empirical contribution through a case study of a rural community in Bangladesh, demonstrating the practical feasibility and significance of integrating IK with SK. This research has offered evidence on the application of IK throughout a knowledge management model (KM) to tackle local agricultural issues while achieving overarching sustainability objectives, in contrast to studies that are either theoretical or centered on generalized notions. The results indicate that local stakeholders in Bangladesh see IK as a valid and technically feasible method, prompting them to amalgamate it with SK within a KM framework. This observation contrasts with previous studies that frequently indicate a resistance to or mistrust toward IK among development professionals. The study emphasizes the cognitive and behavioral incentives of local stakeholders to interact with Indigenous Knowledge, particularly in relation to ecological sustainability. Prior literature has frequently assigned IK a passive role, presuming that communities would solely embrace SK-driven activities. This study refutes that notion, demonstrating that stakeholders see the environmental and cultural aspects of IK as crucial for attaining sustainability and ecological equilibrium. This research supports that KM may facilitate the integration of IK and SK in a manner that is psychologically and culturally validating for local populations, hence fostering resilience and creativity within KM. By establishing IK as a fundamental component of KM rather than a supplementary one, the study sets a benchmark for future research to see IK-SK partnerships as a conventional strategy for sustainable development and KM. This integrated KM method addresses a significant deficiency in existing literature, demonstrating the symbiotic relationship between IK and scholarly knowledge (SK), hence promoting sustainability in alignment with both local and global requirements.

This research aids policymaking by providing a pragmatic, evidence-based framework for the incorporation of IK and SK into development plans, thereby transforming national and international policies towards more inclusive and sustainable development. This study experimentally illustrates how local communities may integrate IK with SK to tackle agricultural and environmental issues, therefore emphasizing the shortcomings of uniform, SK-centric methodologies typically utilized in development initiatives.

The research underscores the necessity for national politicians to implement policies that recognize and institutionalize IK within KM, so establishing a basis for sustainable local practices that can enhance scientific advances. International organizations, especially those financing pro-

development initiatives, are urged to contemplate locally integrated KM that utilizes IK, so creating policies that honor cultural contexts, improve community involvement, and advance information-sharing systems. This inclusive strategy might enhance the adaptability of development initiatives to regional demands, hence boosting their relevance and efficacy in undeveloped regions such as Bangladesh.

This integrative approach may direct policy towards a collaborative form of knowledge co-creation, fostering a future in which IK is acknowledged as an essential resource for tackling global sustainability concerns, while also empowering local people as co-partners in development.

Overall, according to the findings of this study, IK provides problem-solving strategies for local communities and helps shape local solutions aimed at revitalizing farming system and environment. Finally, a number of recommendations for integrating IK in the current agricultural knowledge and information systems toward sustainability have been proposed:

• Other IK systems to be understandable to farmers.

• Implementable (socially, economically and environmentally).

• Emanated within communities, based on local needs, and specific to culture and context (environment and economy).

• Providing core knowledge with flexibility for local adaptation (For example, participatory on farm experiments) for implementation.

• Using local knowledge and skills, and experiences based on rural ecology.

• Has been proven to be time tested and useful in complex, diverse and risk prone (CDR; third agriculture) conditions.

• Understand and establish the value of IK in present context and build a foundation for its integration with other knowledge and operational subsystems toward sustainability.

• Systematically document the IK on sustainability of farmer's organizations.

• Test the value of indigenous knowledge and identify appropriate practices for integration in the context of "agriculture sustainability".

• Demonstrate through national and regional pilot programs, the applicability of IK with appropriate adaptation, as a subsystem to raise awareness and support programs of sustainable agriculture development.

• Institutionalization of indigenous knowledge systems through international and regional efforts.

• Advocacy with national and local governments for inclusion of their local IK as well as adaptation of IK from other relevant communities in their agriculture management plans.

• Integration in the policy frameworks and agendas of sustainable agriculture knowledge and information system.