THE MEDIATING ROLE OF KNOWLEDGE MANAGEMENT IN THE RELATIONSHIP BETWEEN INTELLECTUAL CAPITAL AND INNOVATION PERFORMANCE OF BANKS IN A DEVELOPING COUNTRY PERSPECTIVE

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Information of Article	ABSTRACT
	Purpose: The study investigated the direct and indirect effects of Intellectual Capital (IC) on Innovation Performance (IP) using Knowledge Management (KM) as mediating variable. Design/methodology/approach: EFA and SEM were employed to identify and validate the battery of factor structures. Findings: IC directly influenced KM while KM directly affected innovations. Hypothesized direct effects of Social Capital (SC) and Customer Capital (CC) on IP were partially supported, while the indirect impact of Human Capital (HC) on innovations was not supported. Inexplicably, the relationship between HC and Product Innovation (PDI) was negative though HC directly affected PDI, challenging the existing theoretical underpinnings. Practical implications: The study concludes KM has a mixed (full, partial, competitive) mediation effect in the relationship between IC and innovation performance. Originality/value: The paper contributes to the limited empirical literature examining the relationship between IC, KM & IP in the sub-Saharan Africa banking sector.

1. Introduction

The role of financial and technological advancement in the fragility of the banking sector is being heatedly debated in terms of banking strength in SSA countries. A large banking sector and monetary union membership perform more effectively than others, suggesting a good Fintech innovation strategy could be somewhat different even between countries of the same region (Nguena, 2020). Also, it has been argued the technologies and expertise for complex and large-scale ventures are lacking for SSA companies (Osabutey, Williams, & Debrah, 2014), mainly due to the lack of the necessary intermediating institutions (Osabutey& Croucher, 2018). Innovation is a fundamental requirement and main driving force of survival and growth in today's increasingly global and highly competitive business environment shaping the fate and future of corporate entities (Bohlmann, SpanjoL, Qualls, and Rosa, 2012; De Jong, 2013; Lechner and Gudmundsson, 2014; Chatzoglou and Chatzoudes, 2018). Banking sectors invest in information technology, which has played a crucial role in advancing accounting information systems, to improve their economic performance by increasing information dissemination, decision-making, organizational capacities, organizational excellence, receptiveness, and delivery (Silassie, Dahalan, & Muhammad, 2021a). Thus, innovation has become a long-run and multifaceted phenomenon with complex processes and interactions involving various stakeholders (Phan, Wright, Ucbasaran, and Tan, 2009; Lawler, 2011; Uzkurt et al., 2013). The variation in the type and number of resources firms input into the innovation process and their dynamic and active interactions with stakeholders and the environment limits firms' innovation capability and organizational success (Chatzoglou and Chatzoudes, 2018; Urban and Wood, 2017). Consistent with this, Osabutey & Croucher (2018) opine good institutions enhance effective T&K transfer. In today's competitive business environment, excellence in all phases of the productive process and flexibility are preconditions for success (Corvello and Migliarese, 2007). Also, the goals of ambitious organizations can mainly be achieved through innovation as it is one of the critical resources needed to achieve sustainability and economic growth (Cooper, 2011; Atalay and Anafarta, 2011). Especially in a turbulent economic environment with rapid and drastic changes in technology, markets, customer preferences, expectations, and financial and economic crises, firms are facing an "innovate or die" situation accentuating innovation as a key instrument to thrive and fix emerging problems and challenges (Madrid-Guijarro, Garcia, & Van Auken, 2009; Savelsbergh, Gevers, Van der Heijden, & Poell, 2012; Somech & Khalaili, 2014).

Managers receive information from inside and outside sources (through patents, licenses, or scientific and technological consultancy) to foster innovation (Carlsson, Corvello and Migliarese, 2009; Corvello, Iazzolino and Ritrovato, 2013) to overcome various challenges and seize opportunities. Meeting challenges or improving the current state requires solutions in the form of new products or processes. These innovations are outcomes of a firm's intellectual capital (IC) investment in its interaction with the environment (Messmann & Mulder, 2012). Such investments are reflected in value creation and extraction at the heart of KM that practitioners use as a business strategy to impact performance (Chase, 1997). A plethora

of empirical research examined the relationship between intellectual capital, knowledge management, and innovations in one way or the other. Some studied the relationship among IC, KM practices, and firm performance (Hussinki, Ritala, Vanhala, & Kianto, 2017; Wang, Wang, Cao, & Ye, 2016; Bontis, 1999; Inkinen, 2016). Few investigated the relationship between IC, KM, and innovative intelligence (Ngah, Abd Wahab, & Salleh, 2015). Others analyzed the interplay between IC, KM, and social capital (Ramadan, Dahiyat, Bontis, & Al-Dalahmeh, 2017) and intangible assets and innovation (Omoush, 2019). Still, few attempted to integrate IC and KM (Wiig, 1997). Innovation is crucial to achieving competitive advantage both in the manufacturing and service sectors, although most innovation research focused on the manufacturing industry (Droege, Hildebrand, & Forcada, 2009; Perks, Gruber, & Edvardsson, 2012; Hakimi, Triki & Hammami, 2014; Lazzarotti, Bengtsson, Manzini, Pellegrini, & Rippa 2017; Chatzoglou & Chatzoudes, 2018; Tavassoli, 2018; Charterina, Landeta, & Basterretxea, 2018). Despite these severe attempts to study the relationship between IC, KM, and innovations, the results are mixed. There are contradictory shreds of evidence about the direct effect of IC on innovations. Yet none of them has analyzed its indirect effect through KM. For instance, some found HC has a positive impact on innovations (Tseng, Wang, & Yen, 2013; Prihadyantiet, Surjandari, & Dianawati, 2012; Schneider, Gunther, & Brandenburg, 2010; Boris, Anita van Gils, & Eva, 2009) while Subramaniam and Youndt (2005) posits otherwise. This contradictory evidence and voids established the research gap for this study. The current study investigated IC's direct and indirect effects on innovations using KM as an intervening variable.

Another interesting perspective is the difference between manufacturing and service sector contexts. Some work has been done to test the relationship between IC and innovations in the manufacturing sector, but no adequate investigation is carried out in a service setting (Ahmed, 2014). Research investigating IP in the service sector are fragmented and underrepresented. In contrast, none investigated the effect of IC on innovations (Gopalakrishnan and Damanpour, 2000) except in the telecommunication sector (Obeidat, Tarhini, Masa'deh, & Aqqad, 2017). Moreover, no previous literature introduced KM as a mediating variable regardless of suggestions by authorities such as An and Ahmad (2010). Therefore, the current study analyzed IC's direct and indirect effect on innovations using KM as an interaction variable. Banks' perceptions (Ethiopian) customers established the study setting for six important reasons. First, like most developing economies, Ethiopia showed its utmost desire to join WTO in the coming few years, paving the way for foreign banks to open their branches, presenting an unprecedented stiff competition on existing local banks. However, the absence of government policies and incentives to foster foreign-local collaboration may hinder knowledge and technology transfer. Moreover, local firms in SSA may lack the technology and knowledge to handle complex and large-scale projects (Osabutey, Williams, & Debrah, 2014). Second, banks promote economic growth in emerging economies by channelling scarce financial resources from those who lack abundant opportunities to those who have effective options (Rehman, Rehman, & Usman, 2012). Third, bank services are considered the main product of all economic activities for individuals, firms, and governments. Fourth, banks represent one of the essential knowledge-intensive industries where IC becomes a key resource to promote innovations and sustain profits (Khedr, 2008). Fifth, the context of innovation differs from sector to sector and region to region. A theory produced in one sector or region might not be generalized in another sector (Adams, 2003). For example, owing to the difference in economic development between SSA and the East Asia region, SSA exhibited a low level of T&K transfer (Osabutey et al., 2014).

Finally, banks have bought different technological products and systems that boost their service efficiency and reliability. The rest of the paper is organized as follows. Section II addresses relevant literature. Section III discusses the research design and methodology. Section IV presents empirical results. Section V discusses the results. Section VI provides concluding remarks implications and outlines future research directions.

2. Literature Review

2..1 Theoretical Approach of Knowledge Management, Intellectual Capital and Innovation

The literature on IC and KM has much in common. IC has various components, including human capital (skills, know-how, competence), stakeholder partnerships (customer relationships, license arrangements, delivery agreements), structural capital (organizational capital and customer capital), and corporate resources are examples of IC resources (systems, processes, organizational culture, management philosophy, intellectual property, brands) (Hsu & Sabherwal, 2012; Marr, Gupta, Pike, & Roos, 2003). Also, Youndt, Subramaniam, and Snell (2004) and Subramaniam and Youndt (2005) grouped IC into three major components: HC (knowledge, skills, and capabilities of individual employees); organizational capital (institutionalized knowledge and codified experience residing in databases, manuals, culture, systems, structures, and processes); and SC (knowledge embedded in networks of relationships and interactions among individuals). IC measures the existing stock knowledge at a particular point in time in an organization (Moon & Kym, 2006) and explores the essence of organizational know-how and its various kinds and their impact on business success (Roos, Roos, Ed-vinsson and Dragonetti, 1998). It is also the secret to sustainability and a key element for enhancing productivity, reliability, and competitiveness in a constantly evolving world. IC is one of the main factors contributing to creating value and competitive advantage for organizations (Abualoush, Masa'deh, Bataineh, & Alrowwad, 2018; Dost, Badir, Ali, & Tariq, 2016). Besides, it captures the strategic asset of creativity and growth focused on innovation. At the same time, KM literature focuses on IC-management systems and methods (Alavi & Leidner, 2001; Sabherwal & Sabherwal,2005). It is the sum of systemic processes that assist an organization in producing, using, distributing, and

communicating knowledge to all members and beneficiaries (Masa'deh 2016). KM is a process that continually involves a wide range of activities and practices to identify, create, disseminate, implement, preserve and facilitate the transfer and retrieval of knowledge. It, thus, has a positive effect on performance improvement, cost reduction, and capacity improvement (Nonaka et al., 2000). Also, it helps companies to turn data & information into valuable knowledge that satisfies corporate objectives (Fombad, 2018). It deals with how people's interactions are managed and how processes, management, and society influence people. Financial innovation has spurred economists' interest in the literature, and numerous aspects of arguments are highlighted that are frequently correlated with financial innovations (Silassie, Dahalan, & Muhammad, 2021b). The concept of innovation is complex and multifaceted (Kogabayev & Maziliauskas, 2017). The pioneering work of Schumpeter, (1982), conceptualized the idea of innovation as the economic effect of technological transition and applying new combinations of existing productive forces to solve market problems. On the other hand, Twiss, (1989) defined innovation as integrating Science, technology, economics, and management, while Afuah (1998) conceptualizes it as novel knowledge built-in products, processes, and services.

2.2 Intellectual Capital and Innovation

The inputs for innovation, among others, shall embrace the components of IC. Extant literature widely and consistently endorses a positive and significant relationship between SC and innovations (Subramaniam and Youndt, 2005; Molina and Martinez, 2010; Syed et al., 2014; and Baba and Walsh, 2010) though few who claim emphasis only is given to certain aspects of SC such as trust (Xiaobo and Sivalogathasan, 2013). In an attempt to address such critics, the current study incorporated all elements of SC. It investigated their relationship with innovations hypothesizing SC has a positive direct effect on innovations following the popular claim. There exist mixed results of studies on the relationship between HC and Innovations. While most researchers claim a positive relationship between HC and innovations (Gomes et al., 2015; Mohammad and Hassan, 2013; Rosni and Rosli, 2013; Schneider et al., 2010; and Ahmad, 2012), Subramaniam and Youndt (2005) found negative relationship which may be considered as a provocative exception that provokes the need to know more about such relationships. Nonetheless, given the lack of a solid theoretical lens to assume otherwise, we assume HC directly positively affects innovations.

Designing and redesigning services require solid knowledge about customer needs for better and radical process innovations that use dynamic cooperation between firms and customers. Customer capital which entails a more comprehensive and stable stock of connections, interactions, relationships, linkages, closeness, goodwill, and loyalty between a firm and its customers, downstream clients, strategic partners, or other external stakeholders, is an essential element of IC (John, 2013). Customers are cornerstones of innovation (Santos et al., 2011), and co-creation, even more so than the service provider, are inseparable from service creation (Grönroos 2008). Likewise, empirical evidence suggests that CC has a positive relationship with innovations (Chen et al., 2006; Santos et al., 2011; John, 2013; Mohammad and Hassan, 2013; Ahmed, 2014; and Bustinza et al., 2019) which mostly gets reflected through new product developments. Following such broad and popular claims, we hypothesize CC has a positive relationship with innovation.

H1: IC has a direct effect on IP
  H1a: HC has a direct effect on IP
 H1b: SC has a direct effect on IP
H1c: CC has a direct effect on IP

2.3 Intellectual Capital and Knowledge Management

Though IC and KM are related, they have developed entirely independently of one another, unlike the claim of old literature that they are fundamentally related (Hsu & Sabherwal, 2012). IC and KM are distinct concepts that can be used to refer to knowledge stocks and processes, respectively (Hsu et al., 2012; Haas & Hansen, 2005). Both are critical foundations for corporate competitiveness, and neither can be studied in isolation (Wiig, 1997). However, empirical research on the bidirectional relationship between IC and KM is rare (Hsu et al., 2012). Hoffman et al. (2005) found organizations with a high level of SC have more KM capabilities than others with a low level of SC, while Martínez et al. (2012) indicated social interaction and network tie dimensions of SC have a positive effect on knowledge acquisition. At the same time, Petruzzelli et al. (2007) emphasize the geographical, organizational, and cognitive proximity for better knowledge access. Likewise, Shih et al. (2010) recounted the interactions between customers and employees achieving more absorption of information which built the accumulation of organizational capital. This can be facilitated by using ICTs to integrate data, documents, and employees for better knowledge exchange, innovation, and work execution (Palacios-Marqués et al., 2015). Thus, ICT can distribute and share individual experiences throughout the organization. ICTs also allow the participation of users and partners in remote places.

Extant literature offers explanations that IC affects KM through its various components. SC facilitates KM as interpersonal relationships allow knowledge integration, within-firm knowledge exchange, interfirm knowledge transfer, and knowledge formation (Hsu & Sabherwal, 2012). Also, HC influences KM as individuals within an organization can create relevant and necessary KM processes and use their expertise to enhance KM (Argote, McEvily, & Reagans, 2003; Nonaka & Takeuchi, 1995). Finally, Customer Capital measures the value of a company's relationships with its clients. Customer capital through customer participation in major organizational issues and using their critical feedback to trigger

companies' KM practices so that IP is enhanced. Customers' experiences are the most significant source of insight and intelligence conversion (Sanchez-Gutierrez, Gaytan-Cortes, & Ortiz-Barrera, 2009).

H2: IC has a direct effect on KM

H2a: HC has a direct effect on KM
H2b: SC has a direct effect on KM
H2c: CC has a direct effect on KM

2.4 Knowledge Management and Innovation Performance

Endogenizing the productivity heterogeneity of firms is possible when firms invest in innovation inputs that simultaneously upgrade product and process innovations (Bustos, 2011 and Caldera, 2010 cited in Tavassoli, 2018). Because of changing consumer needs, stiff competition for the market, and rapid technical development, innovation has become increasingly complex and dynamic (Cavusgil, Calantone, & Zhao, 2003). The increasing stock of knowledge available to companies has also raised the dynamism of their innovation capability. Since innovation is highly reliant on knowledge stock and its management, the complexity caused by the explosion in the creation and supply of knowledge needs to be recognized and managed to efficiently support firm innovation and competitiveness (Carneiro, 2000; Du Plessis, 2007). Knowledge is the primary input to innovation (Capaldo and Petruzzelli, 2014). Its processes enhance innovation, improve organizational performance, and bring sustainable competitive advantages (Ju et al., 2006; Johannessen and Olsen, 2009; Antonio et al., 2012). Similarly, Darroch (2013) and Andreeva and Kianto (2011) empirically tested that knowledge management significantly affects innovations. Nonetheless, Young et al. (2010) caution knowledge can't promote innovation if it isn't managed (shared or distributed to relevant people). This implies it is the application of the knowledge that mainly boosts IP. A learning organization attribute positively contributes to innovation performance (Lundvall & Nielsen, 2007). Thus, management must work towards seizing the various opportunities for innovation through Knowledge Management processes by controlling organizational factors to manage human obstacles to KM (Castro, López-Sáez, Delgado-Verde, Donate, & Guadamillas, 2011; Brand, 1998). However, not all components of KM affect firm IP. While knowledge creation, knowledge organization, knowledge dissemination, and knowledge application components of KM influence firm innovation capability, knowledge identification, knowledge storage, and knowledge collection don't (Mehrabani & Shajari, 2012). Of course, there exist potential conflicts and incongruities among KM practices for various innovation episodes (Swan & Newell, 2000).

H3: Knowledge Management has a direct positive influence on Innovation Performance

2.5 Intellectual Capital, Knowledge Management, and Innovation Performance

There are few and sporadic empirical studies that partially investigated the mediating role of KM on IP but missing important variables. For example, the study by Huang and Li (2009) examined the mediating effects of KM on social interaction and IP but focused only on administrative and technical innovations. Ahmed (2014) also studied the relationship among some components of IC and IP compromising internal validity to maintain parsimony. Moreover, Chen and Huang (2009) examined the mediating role of KM on strategic human resource practices and IP. But, it is crystal clear that SC and CC elements of IP were not addressed. Finaly, Lai, Hsu, Lin, Chen, & Lin (2014) found KM mediates the relationship between industry clusters and corporate IP. A conceptual framework has been developed (Figure 1).
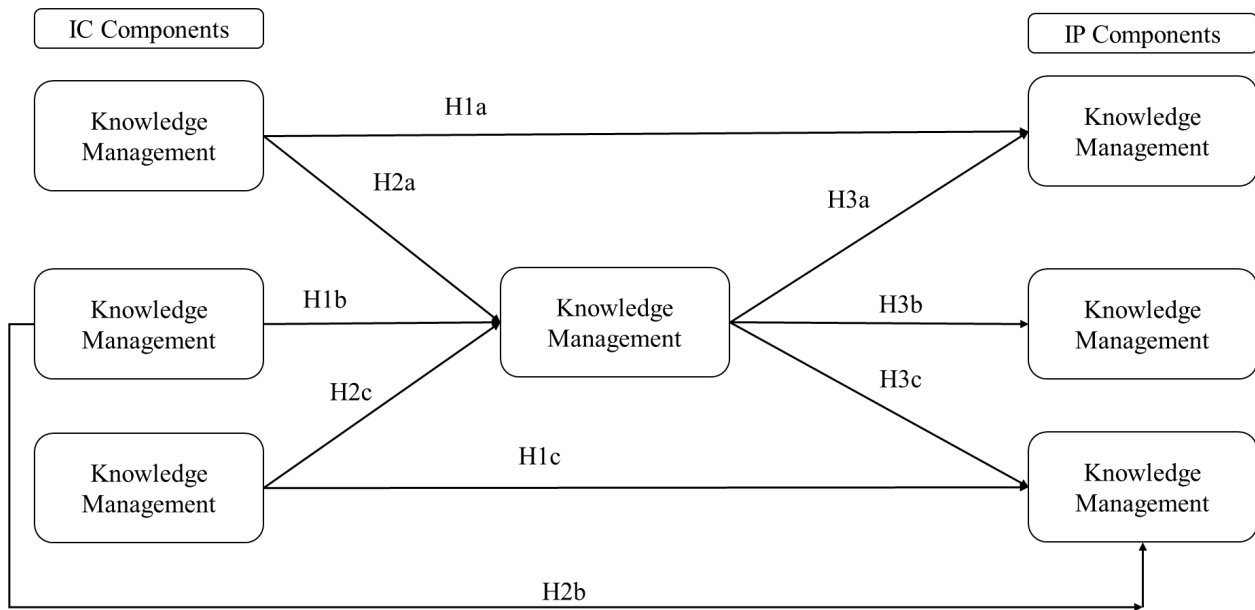
Figure: 1 Research model

H4: IC has an indirect effect on IP via KM

H4a: HC has an indirect effect on IP via KM
H4b: SC has an indirect effect on IP via KM
H4c: CC has an indirect effect on IP via KM

3. Design and Methodology

The research followed a deductive approach, quantitative method, cross-sectional survey as strategy, and questionnaire as data collection instrument. These have been done to answer the research questions by formulating research hypotheses testing as demonstrated above. The hypotheses tested should answer the study's research questions (Saeed & Bekhet, 2018); (Saeed et al. 2017). An inferential analysis involving multiple regressions, coefficient of determination, and correlations analysis was carried out to establish a relationship between antecedent, intervening, and outcome variables. Study results maintained strong psychometric properties when we employed experimental design to identify underlying structures with exploratory factor analysis (EFA) using principal component analysis (PCA) and explanatory design to assess construct validity with confirmatory. Factor analysis (CFA) using structural equation modelling (SEM) evaluates latent variables and tests multiple relationships in the measurement and structural models. The population used for this study was branch managers of 18 commercial banks located in Addis Ababa, Ethiopia. According to the National Bank of Ethiopia (2015), 870 bank branches, each having its manager setting our sample frame. The respondents were branch managers as they are in the best position to master operations and understand managerial and strategic implications (Mahmood and Wahid, 2012). A primary cross-sectional data using a questionnaire was collected on a five-point Likert scale. Both simple and stratified sampling techniques were used to select a required sample size of 274, of which 228 were in good form, yielding a response rate of 84%. As the data and results section discussed, the study followed a scrupulous procedure to achieve the required data reliability and instrument validity.

4. Data and Results

4.1 Data and Testing

Data were collected with a total of 58 items of 7 factors. HC dimension covering issues related to employee skills, qualifications, and the experience was represented with 9 items. SC explaining the informal communication, trust, interaction, and collaboration of employees among themselves represented with 11 items. CC derived from the relationships with customers was represented with 8 items. KM as the process of creating, sharing, and applying knowledge resources was represented with 9 items. PDI related to developing new services (Un et al., 2010) such as mortgages, ATMs, m-banking, e-money, e-wallets, debit cards, and personal bankers (Ahmed, 2014) was represented with 4 items. PCI is the discovery of new processes or methods for the production of services, including automated voice response systems, computers, faxes, the internet, the streamlining of the cheque-handling process, and the creation of new methods of service delivery (Ahmed, 2014) was represented with 7 items. OI capturing the application of new ideas to improve administrative processes, organizational structures, and human resources was represented with 10 items. Although OI may not help create new services, it can indirectly affect their introduction (Damanpour, 1987).

The study used three criteria to evaluate the reliability of the questionnaire: Cronbach's alpha ought to be above 0.70 (Hair et al., 2010), corrected item-total correlations ought to be not less than 0.35 (Netemeyer et al., 2003), and inter-item correlation not exceeding 0.8 for all pairs of items. Following these, 7 items were dropped, and 51 items were left. Outliers or extreme values were found and solved with the winterizing technique. Linearity assumption was checked using curve estimation for all the relationships in the model. All the relationships were sufficiently linear to be tested using a covariance-based structural equation modelling algorism. Multicollinearity was tested for all independent variables in which the VIF results were below the threshold of 3.3 (Keith, 2006), indicating no multicollinearity. The normality of the data was checked using skewness and kurtosis and found approximately normal. Non-response bias was also checked using an independent sample test as the response rate of the questionnaire was only 84%, and found no problem with it.

4.2 Item Generation

In factor analysis, the oldest and best-known statistical technique was used for explaining the relationship between a set of observed and construct variables (Byrne, 2010; Byrne 2016) which can be used for different purposes. It evaluates the validity of measurements, confirms or develops a theory by investigating the observed variables that belong to latent ones, and produces a smaller group of latent variables consisting of a large set of observed variables (Field, 2009). We performed Factor analysis using both exploratory and confirmatory factor analysis.

4.2.1 Exploratory Factor Analysis (EFA)

EFA aims to obtain a set of factors explaining the structure of the interrelationships between items that should relate to each other to produce an appropriate structural model (Hair et al., 2010; Fabrigar and Wegener, 2011; Byrne, 2016). It has primary objectives of identifying factors, discovering the strength of relationships between each factor and each observed measure, and reducing data set to a more manageable size whilst retaining as much of the original information as possible (Field, 2009). EFA was checked using principal component analysis (PCA) and factorability of the data through Kaiser-Meyer-Olkin (KMO) measure of overall sampling adequacy, which assesses how many indicators are appropriate for factor analysis. The data's KMO was 0.918, confirming data was suitable for conducting factor analysis. We used Varimax rotation to determine the number of factors explaining most variances in the data and identified seven factors accounting for 62.28% variance, which is good (Kim and Mueller, 1978). The seven factors identified were OI, CC, PDI, HC, SC, PCI, and KM, consisting of 7, 3, 3, 6, 5, 4, and 3 questions, respectively (Table 1.1, 1.2, 1.3).

Table: 1 Constructs, variables, and items used by extant literature

Construct	Related items	Literature
IC	HC	
	Our bank acquires employees with suitable knowledge and competences	Elsetouhi
	Our bank retains the most talented employees who have a suitable educational level.	(2014)
	Employees can work brightly.	
	Employees have skills for creation innovations.	
	Our employees are experts in their particular jobs and functions.	Subramaniam & Youndt (2005)
	Our bank increases the competence of employees by providing training opportunities	Mercy (2013)
	Our bank encourages employees to acquire additional academic qualifications	
	SC	
	Employees often exchange information informally.	Elsetouhi
	Our bank is characterized by personal friendship among colleagues at multiple levels.	(2014)
	Employee avoids making demands that can seriously damage the interests of the other.	
	Our colleagues clearly understand the goals/values in our bank.	
	People in our department are enthusiastic about pursuing the collective goals of the whole bank.	
	Our employees are skilled at collaborating to diagnose and solve problems.	Subramaniam &Youndt (2005)
	Our employees interact and exchange ideas with people from different areas of the bank.	
	Our bank obtains a lot of information from employees through their social networks	Mercy (2013)
	Our bank has established linkages with other firms	
	Our bank shares a lot of information with other banks within the banking industry.	
	Our employees mutually trust each other.	
	CC	
	Our customers would indicate that they are generally satisfied with our bank.	Elsetouhi
	Our bank tries to offer the best service to customers in the banking industry	(2014)
	Our bank considers customers' needs and wants.	
	We are confident of our future with customers	
	Our bank obtains frequent feedback from customers about the quality of services provided	Mercy (2013)

6

There are established mechanisms through which customers can channel their complaints
Customer satisfaction surveys are carried out frequently
Customer claims are processed within a reasonable period

Table: 2 Constructs, variables, and items used by extant literature

Construct	Related items	Literature
KM	Our employees are able to develop new ideas and knowledge Our bank's knowledge is mostly contained in manuals, databases, etc. Our bank embeds much of the knowledge and information in structures, systems, and processes Our bank protects vital knowledge and information to prevent loss in the event key people leaves the organization Our bank provides IT support for information and knowledge storing Our bank provides IT support for information and knowledge sharing Our bank provides IT support for information and knowledge application Our bank always provides the necessary source of knowledge such as internet, publications, training manuals, good work practices	Quink (2008)

Table: 3 Constructs, variables, and items used by extant literature

Construct	Variables and related items	Literature
IP	PDI Our bank is able to replace obsolete service. Our bank develops its services speedily. Our bank innovates many services like packaged accounts/ services for target market. Our services are innovatively designed	Elsetouhi (2014)
	PCI Our bank is able to manage a portfolio of technological methods. Our bank is able to absorb the basic technologies of business. Our bank has valuable knowledge for technological process- innovation. Our bank continually develops programs to reduce service costs Our bank organizes its service processes efficiently. Our bank assigns resources to the service processes efficiently. Our bank is able to maintain a low-level service process without impairing the service.	Elsetouhi (2014)
	OI Our bank implements practices for employee development. Our bank uses quality-management systems. The new welfare system of the bank provides incentives to our staff. Staff recruitment system of our bank is effective. The new performance assessment method adopted by our bank can enable department heads to know how far the staffs have achieved the bank's goals. Our performance appraisal method can effectively monitor the actual difference between our performance and our goals. Our bank renews the routines, procedures and processes employed to execute firm activities in innovative manner. Our bank renews the organizations' structure to facilitate teamwork. Our bank leadership responds to employee suggestions without defensiveness and negativity Our bank encourages innovative employees through rewards, recognition, promotion, etc.	Elsetouhi (2014)

Initially, 51 items with eleven factors explained 63.09% of the variance. Still, later on, these factors were reduced into seven because some variables unrelated to any of the elements and had low loadings were dropped, accounting for only 62.28% of the total variance.

4.2.2 Confirmatory Factor Analysis (CFA)

After identifying the underlying structure using EFA through PCA, confirmatory factor analysis (CFA) through structural equation modelling (SEM) was used to assess construct validity (convergent and discriminant) through model fit indices (Tabachnick and Fidell, 2007). CFA is a more complex set of techniques than EFA to confirm specific hypotheses when the researcher knows measures correlate with the latent variable. Researchers suggest relationships between the observed items and factors tested statistically (Byrne, 2010). This study conducted an SEM process using Analysis of Moment Structures (AMOS) version 20.0 for measurement and structural models.

7

Measurement model. It was used to find the most parsimonious model, which is well-fitting and valid, by evaluating construct validity in terms of convergent and discriminant validity to discover the extent to which the measures have adequate internal consistency by conducting the necessary tests the acceptance levels for the goodness of fit. In CFA, convergent validity measures whether items of the same latent factor share a proportion of variance (Hair et al., 2010). Discriminant validity was used to know how latent variables differ from each other (Figure 2).
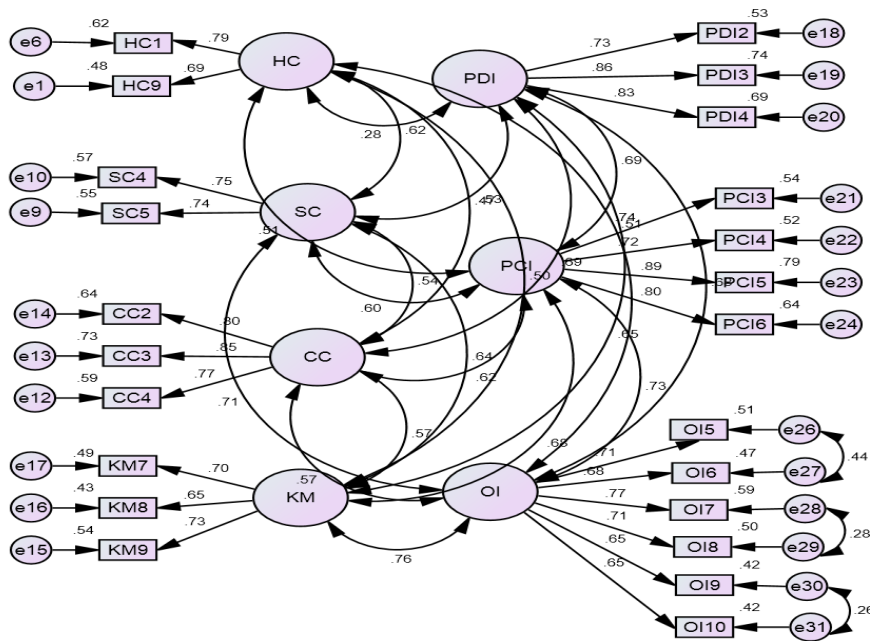

Figure: 2 CFA measurement model (final)

Structural model. It was used to test the causal relationship between latent variables in the significance of the structural relationships (see Figure 3, Table 4, and Table 5).

Table: 4 Rotated component matrix

	Rotated Component Matrixª Components						
	OI	CC and PDI	HC and SC	PCI	KM	SC	SC
The new performance assessment method adopted by our bank can enable department heads to know how far the staff have achieved the bank's goals.	.721						
Our bank encourages innovative employees through rewards, recognition, promotion, etc.	.689						
Our bank leadership responds to employee suggestions without defensiveness and negativity	.689						
Our performance appraisal method can effectively monitor the actual difference between our performance and our goals.	.660						
The new welfare system of the bank provides incentives to our staff.	.651						
Our bank renews the routines, procedures and processes employed to execute firm activities in innovative manner.	.614						
Our bank renews the organizations' structure to facilitate teamwork.	.609						

Our bank considers customers' needs and wants.	.778			
Our bank tries to offer the best service to customers in the banking industry	.758			
We are confident of our future with customers	.702			
Our bank develops its services speedily.	.621			
Our bank innovate many services like packaged accounts/ services for target market.	.606			
Our services are innovatively designed	.556			
Our bank has academically qualified employees		.742		
Our bank acquires employees with suitable knowledge and competences		.724		
Our employees have the required experience to perform their respective job.		.683		
Our employees are experts in their particular jobs and functions.		.649		
Employees can work brightly.		.549		
Our employees are skilled at collaborating with each other to diagnose and solve problems.		.539		
Employees have skills for creation innovations.		.525		
Our bank organizes its service processes efficiently.			.751	
Our bank continually develops programs to reduce service costs			.748	
Our bank assigns resources to the service processes efficiently.			.686	
Our bank has valuable knowledge for technological process- innovation.			.591	
Our bank provides IT support for information and knowledge application				.783
Our bank always provides the necessary source of knowledge such as internet, publications, training manuals, good work practices				.637
Our bank has a KMpolicy or strategy				.593
Our colleagues clearly understand the goals/values in our bank.				.863
People in our department are enthusiastic about pursuing the collective goals of the whole bank.				.849
Our bank is characterized by personal friendship among the colleagues at multiple levels.				.816
Our employees mutually trust each other.				.658

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations

Table: 5 Model fit statistics for structural model

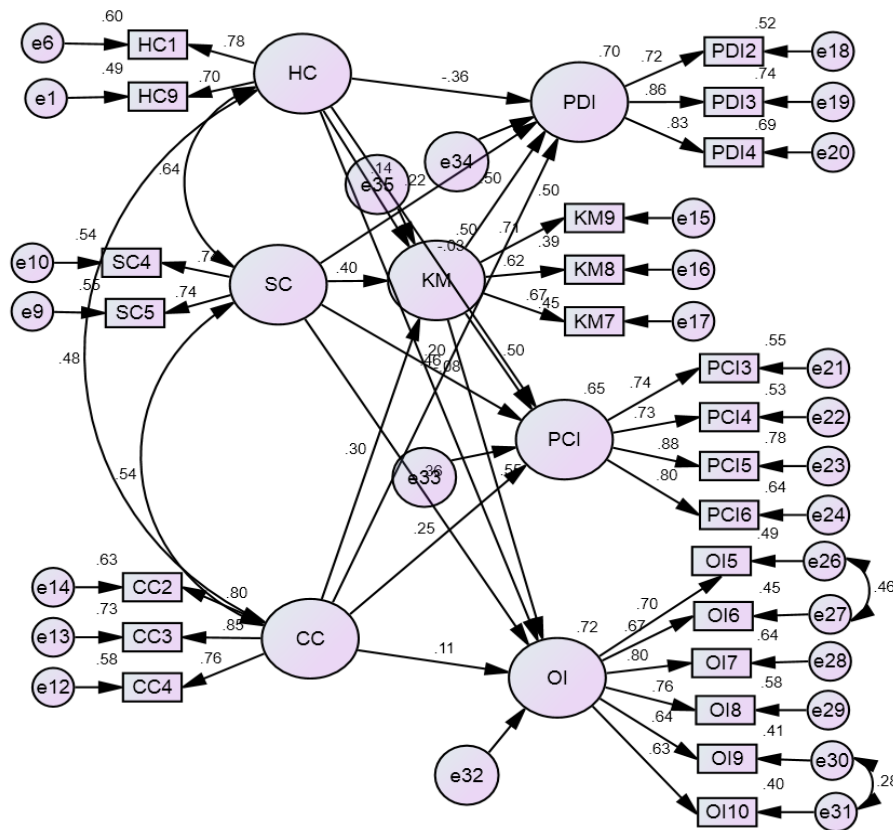| Chi-square		Absolute Fit Indices		Incremental Fit Indices		Parsimony Fit Indices	
X^2	357.852	RMSEA	.056	CFI	.945	PCFI	.784
DF	210	RMR	.038	IFI	.946	PNFI	.729
X^2/DF	1.704			TLI	.934		

9

Figure: 3 CFA structural model (final)

5. Discussion

Discussion of results is presented in four sections: direct effects of IC on IP, direct effects of IC on KM, direct effects of KM on IP, and indirect effects of IC on innovations through KM.

5.1 Effects of IC Components on IP

H1a: HC has a direct effect on IP

Under this sub-hypothesis, three sub hypotheses (H1a1, H1a2, and H1a3) state that HC has a direct positive effect on PDI, PCI, and OI, respectively. Counter to expectations, empirical findings of this study revealed that HC has a significant negative effect on PDI ($\beta = -$ 0.356, P = 0.006) and has a negative effect on PCI and OI though not statistically significant. H1a is not supported since all three sub-hypotheses didn't confirm a priori expectations.

The negative relationship between HC and PDI corroborates Subramaniam and Youndt (2005). Possible justification may include a mismatch between academic qualifications and industry skill requirements. While universities focus on knowledge, banks may focus on interpersonal skills. Also, as suggested by Subramaniam and Youndt (2005), banks may hire fiercely independent experts reluctant to share their ideas with their colleagues, undermining PDI. Moreover, poor job involvement resulting from a misfit between the nature of the job and the personality predispositions of the employees engaged in performing it might also be the contributing factor.

H1b: SC has a direct effect on IP

This sub-hypothesis has three sub-hypotheses (H1b1, H1b2, and H1b3), stating that SC has a positive direct effect on PDI, PCI, and OI. Empirical results of the study revealed that SC has a statistically significant positive impact on OI ($\beta = $ 0.359, P = 0.041), supporting H1b3 which is consistent with Scuotto et al. (2017). However, SC doesn't have a

10

statistically significant relationship with product and PCIs so H1b1 and H1b2 are rejected. As a result, H1b is partially supported.

H1c: CC has a direct effect on IP

Under H1c, there are three sub hypotheses (H1c1, H1c2, and H1c3) stating that CC has a direct positive effect on PDI, PCI, and OI. Empirical results of the study revealed that CC has the most robust and most significant positive effect on PDI, having a standardized path coefficient of ($\beta =$ 0.455, P <0.001) supporting H1c1. CC also has a strong positive effect on PCI, having a standardized path coefficient of ($\beta =$ 0.255, P =0.004) supporting H1c2. Counter to expectations; CC doesn't have a statistically significant relationship with OI. Hence, H1c is partially supported.

5.2 Effects of IC Components on KM

The structural equation modelling analysis findings showed that all three sub-hypotheses (H2a: HC on KM; H2b: SC on KM; H2c: CC on KM) are empirically supported, suggesting IC components have a role in supporting KM in the banking sector. All these actors explained 50% ($R2=0.50$) of the variety in KM, whereas 50% were related to other variables. Therefore, hypotheses H2a, H2b, and H2c are maintained (Figure 4).
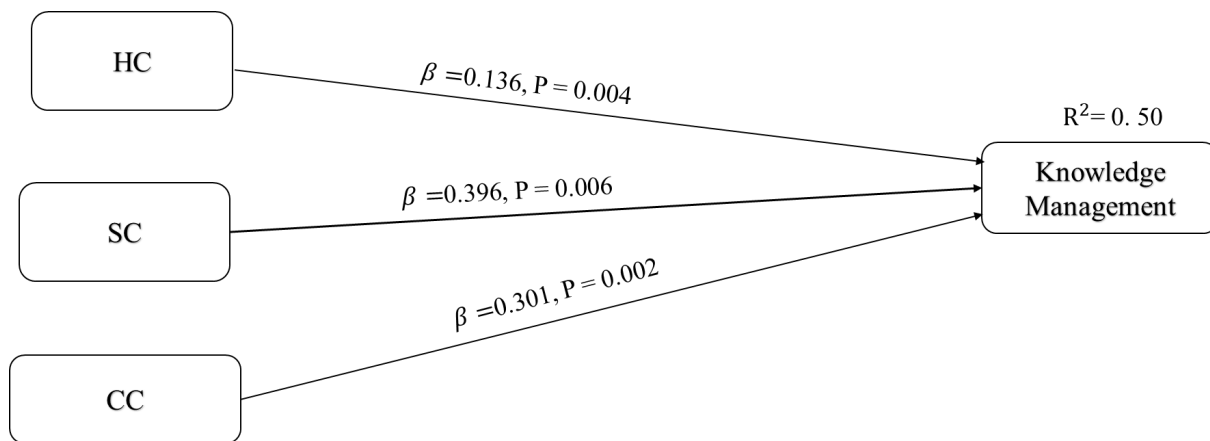

Figure: 4 Interactions between components of IC and KM

HC, SC and CC affect KM with path coefficient of ($\beta = 0.136$, P = 0.004), ($\beta = 0.396$, P = 0.006) and ($\beta = 0.301$, P = 0.002). SC assumed a higher effect on KM than both HC and CC, consistent with Aklamanu et al. (2016), who argued network structures strongly affect employees' opportunities to identify and access others' specific knowledge within and across the organizations. Following SC, CC maintained a strong relationship with KM emphasizing customers is the major stakeholders who can play a critical role by forwarding pertinent information to banks which could serve as a source of knowledge creation.

5.3 Effects of KM on IP

Sub-hypotheses are H3a, H3b, and H3c, which states that KM positively affects the product, process, and organizational innovation. KM was found to directly and positively affect PDI, PCI, and OI. It affects PDI, PCI, and OI with a standardized path coefficient of ($\beta =0.499$, p=0.006), ($\beta =0.496$, p<0.001), and ($\beta =0.548$, p<0.001), respectively. As a result, H3 is supported. The result of this study corroborates the findings of Papa et al. (2018), Del Giudice et al. (2016), and Ahmed (2014). The study results revealed that KM plays a critical role in reinforcing the bank's ability to introduce and implement new products and services, new and efficient processes of doing jobs, and new insights towards proactive management thinking and flexible organizational systems. If banks can create, store, and retrieve employees' knowledge in manuals and systems, they can benefit by using the existing knowledge as a source of innovation.

5.4 Indirect Effects of IC on IP Via KM

H4a: HC has an indirect effect on IP via KM

Under this sub-hypothesis, three sub-hypotheses (H4a1, H4a2, and H4a3) read as HC indirectly positively affects PDI, PCI, and OI. Empirical results of the study revealed that HC has a significant indirect on PDI, PCI, and OI with standardized path coefficients of 0.068, 0.068, and 0.075, respectively, having a P-value of 0.003. Knowledge is an antecedent of innovation through organizational learning (Soto-Acosta et al., 2014). As per the mediation criteria set by Zhao et al. (2010), KM is a competitive mediator between HC and PDI, implying that the mediator identified is consistent with the hypothesized theoretical framework, and direct effect signals that there is a second possibly omitted mediator which can be examined in any future study. KM also fully mediates HC with PCI and OI. This implies that the data

11

support the hypotheses for mediation. Hence, H4a is maintained. The result of this study corroborates the findings of Ahmed (2014).

H4b: SC has an indirect effect on IP

There are three sub-hypotheses under H4b (H4b1, H4b2, and H4b3) proposing SC has an indirect positive effect on PDI, PCI, and OI. As per the results of SEM, SC has statistically significant effect on PDI, PCI and OI ($\beta = 0.198$, P = 0.039; $\beta = 0.196$, P = 0.015, and $\beta = 0.217$, P = 0.011), respectively. KM fully mediates SC with PDI and PCI based on the study's findings. Moreover, KM partially mediates the interaction of SC and OI, implicating the potential for another mediator between SC and OI. Most importantly, the finding shows the strongest effect of SC is on OI compared to PDI and PCI, implying if employees cooperate, communicate and share knowledge and experience, they can design and propose efficient, innovative ideas regarding organizational systems. It is consistent with previous researchers such as Ahmed (2014).

H4c: CC has an indirect effect on innovations

Under this sub-hypothesis, there are three sub-hypotheses (H4c1, H4c2, and H4c3) proposing CC has an indirect positive effect on PDI, PCI, and OI. As per the results of SEM, CC has statistically significant effect on PDI, PCI, and OI ($\beta = 0.150$, P = 0.009, $\beta = 0.149$, P = 0.012 and $\beta = 0.165$, P = 0.006) for PDI, PCI, and OI, respectively. The result shows KM partially mediates the relationship of CC with PDI and PCI. Additionally, KM fully mediates CC and OI. This shows that the data supports the hypothesis for mediation. Consequently, H4c is accepted.

6. Conclusion, Implications, and Future Research Directions

Our conclusions and reflections are on the theoretical, policy, and practical implications and future research directions based on significant empirical findings.

6.1 Conclusion and Implications

HC has a negative effect on PDI, which is entirely unexpected but interesting as it challenges the existing theoretical underpinning on the relationship between HC and PDI. This may be a defining result that will redefine Banks' human resource policy-making premises. This may be due to the widespread adoption of the traditional human resources assignment model in Ethiopia, in which Banks are not exceptions. Thus, Banks need to reassess whether there is a mismatch between expertise and jobs skill requirements. The best remedy would be to adopt a competency-based model in the management of human resources than basing qualifications for job assignments. CC has a positive effect on PDI and PCI, which perfectly aligns with the service co-creation perspective of Service-Dominant Logic Theory (Lusch and Vargo, 2006; Vargo and Lusch 2008) and Service Science Concept (Maglio and Spohrer, 2008). Thus, the implication to practice is to make the service environment user-friendly, educating customers about new service processes to navigate and better co-create easily. Moreover, Banks may nurture a value co-creation culture by promoting tolerance, trust, cooperation, co-learning, connection, etc., in line with Tommasetti et al. (2017).

SC has a positive effect on OI, emphasizing communication, trust, sharing, and informal groups in shaping organizational culture and decision-making processes. Thus, Banks need to encourage informal groupings to generate new ideas and to spread trust amongst members by strengthening the interactions within the social network since SC is positively influencing OI and learning.

Moreover, HC, SC, and CCs positively affect KM, implicating their contribution by expediting the capturing, retrieval, and sharing of existing knowledge and creating new ones. Finally, given the full, partial, and competitive mediation role of KM in the relationship between intellectual capital and innovations, identifying and including more mediating variables will be helpful.

6.2 Future Research Directions

As this research attempted to comprehensively investigate relationships among IC, KM, and innovation capabilities that were fragmentally examined, further investigation in this area is much needed. The model integrating IC and innovation capabilities as proposed in this study should be investigated in other contexts (countries and industries) to explore whether our claim holds in different contexts, which may promote its external validity. We also suggest future researchers consider other mediating variables such as organizational capital, organizational climate, and organizational culture to investigate the effect of IC on innovations.

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13

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14

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