

# The Determinants of Knowledge-based Economy Development at a National Level: A Conceptual Model driven from KBE Theoretical Paradox and Advanced Practices

Sara A. Al-Maadeed

Vishanth Weerakkody

Business School at Brunel University, London, UK

[Sara.Al-Maadeed@brunel.ac.uk](mailto:Sara.Al-Maadeed@brunel.ac.uk)

[Vishanth.Weerakkody@brunel.ac.uk](mailto:Vishanth.Weerakkody@brunel.ac.uk)

**Abstract:** Knowledge-based economy has recently gained an increasing attention in developed countries, however, understanding the main determinants of KBE development at a national level appeared to be neglected. Therefore, this paper tends to develop a conceptual model that addresses the main determinants of KBE development at a national level in which could accelerates the growth of national asset value and leads to national competitive position. Therefore, a systematic literature review was conducted to learn from advanced economies' practices in KBE development and highlight KBE main pillars, drivers, and process of KBE function. The review reveals that :(A) development of human capital and maintaining the value of knowledge asset are the ultimate function(s) of KBE, (B) Learning, education, ICT and innovation are the main pillars of KBE, (C) knowledge management is the process underpinning KBE function, and (D) beliefs and intentions are the main endogenous drivers of individual's commitment to KBE ultimate functions. The findings show that the determinants of KBE development at a national level are: (1) the consideration of KBE characteristics, (2) the consideration of country position, and (3) the consideration of effective knowledge management process that acknowledges KBE function(s), however the cognitive leadership is the enabler to achieve KBE ultimate function via its main determinants. The conceptual model proposed in this paper outlines KBE main determinants and enabler to guide practitioners and decision makers in developing KBE framework at a national level.

**Keywords:** Knowledge-based Economy Model, Knowledge-based Economy Main Determinants, Enabler, Sweden, Finland, Denmark, Strategic Management, Knowledge Management, Cognitive Leadership, Knowledge based economy's theoretical paradox.

## 1. Introduction

Based on Lisbon Agreement 2000, the European Union (EU) set a strategic goal in 2002 to achieve an advanced competitiveness position worldwide as a Knowledge-based economy (EU Lisbon Agreement 2000) (Hervás Soriano and Mulatero, 2010). Although it has become undoubtable national target, its functions, indicators, and implementation approach are frequently disputed by literature. The ultimate function of KBE, suggested by scholars, swings around different indicators: wealth generation and economic growth (Johansson, 2010; Leydesdorff, 2006), scientific knowledge and novelty production (Etzkowitz and Leydesdorff, 2000; Leydesdorff, 2006), or human development and employment growth (van Oort et al., 2009). Although some studies address multiple ultimate functions of KBE (Leydesdorff, 2006), there is always a room for bounded rationality in the identification of KBE ultimate functions and its reflective indicators. In addition, sequential order is hardly highlighted by literature when multiple ultimate functions are indicated. For example, in the Triple Helix theory (Etzkowitz and Leydesdorff, 2000; Leydesdorff, 2006), the addressed main functions of KBE are: (1) the generation of economic wealth, and (2) the generation of scientific and technological novelty, while (3) locally controlling the two functions at a system level. However, the sequential order of these functions is hardly indicated within the Triple Helix theory context.

Furthermore, the integrated form of KBE implementation process that would lead to KBE ultimate function(s) is barely addressed in the literature. Therefore, addressed indicators by literature are debated to be sufficient as a guide for policy makers in the field of KBE development and implementation (Sharma et al., 2013). For example, some of suggested indicators to economic growth are e.g. commercial knowledge or GDP (Johansson, 2010), while to employment growth, are e.g. investment, wages, income, and density of knowledge worker (Oort et al, 2009). Moreover, some suggested indicators by OECD are related to country readiness for KBE development e.g. internet usage per capita, R&D expenditure, ICT infrastructure Expenditure (The World Bank, 2012; World Bank Institution, 2007), however, the indicators related to expenditure would be irreflective to KBE ultimate function(s) unless its effectively allocated and utilized in a strategy focused process that is integrated across institutions to serve KBE ultimate function(s).

Furthermore, some scholars acknowledge human capital and human development as ultimate function of KBE (Curwell et al., 2005; Knight and Routti, 2011; Powell and Snellman, 2004; Yigitcanlar and Lönnqvist, 2013). Following this argument suggests that expectations of returns on KBE ought to be sat in the long run, since the nature of returns on human capital development is mostly strategic which requires, most importantly, investment of time in addition to other financial, and effort investments. Thus, developing well identified reflective indicators that are beyond immediate financial and economic indicators is essential for KBE development. For example, during an education process of a child, as a part of human capital development, the focus would be more on ensuring suitable environment, facilitation, and knowledge utilization. Thus, the focus would be on a reflective approach to KBE characteristics and effective implementation of its ultimate function(s), rather than developing indicators to assess immediate financial returns against the child's learning process. Therefore, this paper tends to fulfil the need for deeply understanding the practicality of KBE function(s) and identify the main determinants of KBE development by highlighting the main pillars, process, and drivers, and identify the ultimate functions(s) of KBE that could accelerate the growth of national asset value and leads to national competitive position. A conceptual model is proposed in the paper in the light of KBE characteristics, the country position, and the main process underpinning KBE function(s). The model attempts to provide guidance for policy makers in the field of developing and implementing KBE strategies at a national level.

To achieve such objective, a systematic literature review was conducted for three selected countries, Sweden, Finland, and Denmark, which are considered as leaders in KBE, to better understand their KBE models and frameworks. This was followed by studying the theories associated with KBE emergence in the literature, and to propose a conceptual model of the main determinants of a KBE framework at a national level. The model considers KBE characteristics, the country setting, and knowledge management process as the main determinants of KBE framework at a national level, and cognitive leadership as a main enabler to effectively implement these determinants.

## **2. Methodology**

A systematic literature review was conducted to understand the main determinants of KBE development via identifying the main pillars, drivers, and processes that are addressed by the literature in KBE domain in selected countries. The focus in this study is on the countries: Sweden, Finland, and Denmark based on the selection criteria which were based on the World Bank Knowledge Economy Index Ranking 2012 of the three highest ranked countries in the world. The search was conducted in Scopus and institutional databases, and focused on journal articles that were relevant to KBE practices in the selected countries. Thus, the selection of keywords followed the same focus i.e. in each search, key phrases e.g. 'knowledge based economy' were developed and used with a selected country name. Thereafter, thematic analysis of the literature was conducted to filter journal articles based on their scope of contribution to KBE development. The search of the Scopus database returned 74 papers, 43 of which were redundant and 31 were relevant, while the institutional library search result 2,153 papers, 2,019 of which were redundant and 134 were relevant. These assessments were made by skimming the articles' titles, abstracts, and conclusions. A second filtering process was adopted by in-depth-reading of the articles' main body for further thematic analysis and filtration based on focus, and categorised the articles under the classification of KBE pillars, drivers, and processes.

The result from Scopus Database was that out of 31 papers, 22 were relevant (9 were redundant), and from the institutional Database out of 134 papers, 70 were relevant (64 were redundant). The redundancy of the papers was decided on the level of relevance to the study focus and scope, for example some articles have a technical focus on industrial scope when addressing KBE, which is out of scope of this study. The final total of the articles from the first and second filtering processes was 92, made up as follows: Sweden 49; Finland 26; and Denmark 17.

The forthcoming sections will provide an overview of the seminal work of KBE definition, emergence, characteristics, issues and challenges. Next section provides descriptive overview of the selected countries to draw lessons from their practices from the literature review and identify the main determinants of KBE development.

## **3. Literature Review**

### **3.1 An Overview of Knowledge-based Economy Emergence, related Process and Drivers**

The social welfare and economic growth have always been considered as a result of knowledge in which reflects the ability to achieve creativity and invention of new products, however theoretical and specialized knowledge has gained an increasing attention by the time for knowledge economy (David and Foray, 2002). KBE is defined as: "the economies which are directly based on the production, distribution and use of knowledge and information and the

role of OECD science, technology and industry policies is to be formulated to maximize performance and well-being in such economies” (OECD, 1996, p.7)

Since the time of post-industrial transformation, the emergence of the knowledge economy has gained conceptual and theoretical support and has evolved across time through various eras as perceived by scholars, such as information society, knowledge economy and learning economy. However, across these eras, “learning” has been perceived as the main process (Archibugi and Lundavall, 2001) and “knowledge” as the essential economic resource of the emerged KBE (Barney, 1991). The liberalisation and globalisation of economies have also influenced the change to the KBE, and as a result governments and institutions took the initiative to embed KBE to respond to openness in markets in knowledge sectors and to enter international competition (David and Foray, 2002; Thurow, 1999).

In the literature, many characteristics of KBE are addressed, however some of the main characteristics of KBE are: (1) the increasing importance of human capital (Curwell et al., 2005; Knight & Routti, 2011; Yigitcanlar & Lönnqvist, 2013; Powell and Snellman, 2004), (2) the high adaptation capacity to change i.e. adopt best practices, and technology change to reach competitiveness (Benner, 2003; Leydesdorff, 2006), (3) advanced technology utilization (Andersson et al., 1990; Curwell et al., 2005; Foss, 2005; Hvidt, 2015; Jones-Evans and Klofsten, 1997; Knight and Routti, 2011; Schienstock, 2007; Schilirò, 2012; The World Bank, 2012; Wiseman and Anderson, 2012; World Bank Institution, 2007), (4) firm and institutional heterogeneity (Foss, 2005; Leydesdorff, 2006), (5) collaboration and networking that demolish boundaries (Krigul, 2011; Leydesdorff, 2006; Ornston, 2012), and (6) efficiency and productivity in managing and utilizing knowledge with strategic alignment (Etzkowitz and Leydesdorff, 2000; Foss et al., 2010). This represents knowledge management process which is identified by scholars at both functional and strategic levels (Benner, 2003; Hvidt, 2015; Jafari and Akhavan, 2007; Knight and Routti, 2011; Powell and Snellman, 2004; Schienstock, 2007; Schilirò, 2012; The World Bank, 2012; World Bank Institution, 2007; Yigitcanlar, 2009a; Yigitcanlar and Lönnqvist, 2013).

### 3.1.1 Knowledge Management Process (KM)

A considerable number of scholars ascribe knowledge management process (KM) in institutions and organisations as a part of KBE at different levels: functional (or operational) level, and strategic level (Leydesdorff, 2006; Sharma et al., 2012; Powell & Snellman, 2004; Schienstock, 2007). The interaction is vertical between the two levels, functional and strategic, while horizontal interaction occur among entities and sectors in collective effort for KBE development (Benner, 2003; Powell and Snellman, 2004; Jafari and Akhavan, 2007; Schienstock, 2007; World Bank Institution, 2007; Yigitcanlar, 2009a; Knight and Routti, 2011; Schilirò, 2012; The World Bank, 2012; Yigitcanlar and Lönnqvist, 2013; Hvidt, 2015 Foss, 2007; Foss, Husted and Michailova, 2010; Krigul, 2011). Therefore, a hierarchical system of control is required for a successful implementation of KBE (Powell and Snellman, 2004; Leydesdorff, 2006).

The Knowledge Management Process at strategic level was addressed by scholars with emphasis on leadership role in developing and monitoring KBE at the national level. Some examples of the elements that are related to leadership role are: the formulation and development of strategic plans and policies to build and maintain KBE at national level; the promotion and implementation of knowledge governance; the motivation and recognition of knowledge workers; the creation of social awareness of KBE; and the development of the required infrastructure for information technology and knowledge societies (World Bank Institution, 2007; Knight & Routti, 2011; Schilirò, 2012; Yigitcanlar & Lönnqvist, 2013; Benner 2003; Powell & Snellman, 2004; Jafari & Akhavan, 2007; Schienstock, 2007; Yigitcanlar, 2009; The World Bank, 2012; Foss et al., 2010; Foss, 2007; Krigul, 2010).

Jafari and Akhavan's (2007) findings illustrate the importance of consensus among the different elements, especially government policies, public belief, social awareness, culture, and organisational changes. The practical implications of successful KM implementation suggest that leadership plays a key role in the change management process. This role is through communicating the need for change, and ensuring consensus and alignment in middle management or at a functional level such as: knowledge productivity via developing experimentation competencies among agents (Johansson, 2010), effective knowledge utilization and allocation (Schienstock, 2007; Sharma et al., 2012; Powell & Snellman, 2004), knowledge sharing through networking and collaboration (Benner, 2003; Jafari and Akhavan, 2007; Ornston, 2012; Parker, 2004; Peters, 2008), new technology implementation (Powell and Snellman, 2004), and managing through the endogenous drivers of knowledge workers.

### 3.1.2 The Endogenous Drivers of commitment to KBE function

There is a growing consensus among scholars as to the importance of endogenous drivers that drive the behavioural commitment towards KBE functions(s), human capital development and maintaining the value of knowledge assets; examples of these endogenous drives are: beliefs, growth need, survival need, interest, threat, and individual and societal values (Andersson, 2006; Curwell et al., 2005; Jafari and Akhavan, 2007; Kostianen and Sotarauta, 2003;

Schienstock, 2007). Furthermore, in the advanced knowledge economies i.e. Sweden, Finland, and Denmark, the acknowledged drivers of KBE function are mostly endogenous (e.g. the threat of being left lagging behind, accelerated economic advancement and growth, or survival need) especially during the financial crisis. However, the challenge is how such endogenous drivers could be managed within KM process context to serve KBE function(s), especially if one of the indicated KBE main characteristics is heterogeneity of working agents. In this context, Foss (2005) suggested belief management, while Leydesdorff (2006) acknowledged intentions as a main driver of KBE. In particular, KBE is acknowledged as a social system (Foss, 2005; Galabova, 2012; Leydesdorff, 2006), and thus reflecting national traditions and cultures in building rational policies is necessary to establish a developed KBE. The ideological legacies of a nation's structure represent how parties perceive a KBE and its implications for social and political change. Andersson (2006) asserted that:

*'the process of social democratic revisionism is dependent on past ideological legacies embedded in political language. The resilience of notions of security in Swedish discourse can be compared to the centrality of notions of competitiveness and individual responsibility in Britain, and these key notions structure the way the parties think of the knowledge economy, as well as of its implications for social and political change ... these elements – security and opportunity, cooperation and competition – inform the notions of safeguarding and renewal as two different notions of modernization' (Andersson, 2006, p.454-455).*

This contributes to the general understanding of endogenous drivers of commitment to KBE function and that KBE development requires an integrated form of policy development where it is important to reflect on social and cultural considerations. The conceptual model proposed in this paper addresses the practices of belief and intention management within the KM process and draws on the institutional and integrated alignment for effective KBE implementation.

### **3.2 KBE Development at a National level**

Despite the resource allocation and knowledge accumulation levels in developed countries, small countries have excelled in the efficiency of resource utilization to develop KBE (Tan and Hooy, 2007). Furthermore, there are distinctive patterns among nations in KBE development, these patterns are linked to a national business system in a long term foundation where a specialised KBE from country context and related settings is suggested (Parker, 2004). This specialization of KBE at national level leads to an integrated KBE cluster across nations for adding value (ibid.). As such, building a foundation of global knowledge from best practices has been addressed by some scholars, who call for an identification and a categorisation scheme for best practices of knowledge cities (Ergazakis et al., 2009). They consider it an important challenge for future research since such practices has been developed in a knowledge-based approach that is specialised for the cities' context. Recently countries like Sweden, Finland, and Denmark emerged as accelerated performers in Western Europe enjoying a strong economic positions and growth, strong public finances, and low to modest unemployment (Ornston, 2012). These countries are leading the old economies such as France and Germany and exceeding liberal economies such as Britain (ibid.). The reason is that they aren't based on market-oriented reform but based on heavy investment in high-quality input (i.e. infrastructure, human capital, and research) and knowledge-intensive inputs (ibid.).

The following section provides a brief overview of the leading countries that have been acknowledged as knowledge economies: Sweden, Finland and Denmark. These economies have the highest ranking of knowledge economy indicators based on the World Bank (KAM) (The World Bank, 2012), and received the greatest attention as a model of knowledge societies. Although these countries have similarities of location and population size, that is less than 10 million; their approaches in KBE development and implementation differ. Thus, it represents a heavy field for learning lessons in KBE development and implementation.

#### **3.2.1 Sweden**

The KBE in Sweden is driven by the productivity of R&D system and various knowledge intensive multinational firms (Benner, 2003). Sweden economy is a mixed economy of government interventions and free-market activities and known for its advanced sectors of medium-high and high-technology and telecommunications. Furthermore, Sweden is well developed as a welfare state more than other European countries. the National system of innovation is operating with surplus value at a national level exceeding the total of the regional innovation systems (Leydesdorff & Strand, 2013).

The early reorganizing of institutional structure after the economic crises was a critical stage in Sweden's modern policy development of specialized knowledge and focused R&D fields (Benner, 2003). The coordinated system in

Sweden explains the recent success in the high technology sectors that depend on new knowledge and a stock of industrial competence amongst a high skilled workforce (Parker, 2004).

Sweden has successfully responded to the new economic system challenges. In 1990s during the financial crises, a strict management of financial policy emerged to implement a ceiling on the costs of the welfare state expenditure and a stable decentralization of wage bargaining, and the foundations of the welfare system have been fairly retained (Benner, 2003). The key lessons learnt are that Swedish system followed the main characteristics of KBE in different institutional, economical, and political settings such as high adaptation of market changes that are in favour of the Swedish market, human capital development, and policy development in R&D within national strategic choices.

### 3.2.2 Finland

Finland has a leading KBE model known for its world-class standardized policy development in innovation (Ornston, 2012). Finland's superior position is mainly in high-technology industries such as telecommunication. Thus, ICT cluster advancement is driven by global Finnish telecommunication companies that enrich the country's market with international networking and specialized knowledge development (Schienstock, 2007). The policy development in Finland is more focused on firm-cantered innovation policy (ibid.). As a small open economy, it is more exposed to the global economic pressure and reform, moreover, the proactive approach of the Finnish economic system maintained the country competitiveness (Knight & Routti, 2011; Schienstock, 2007). Consequently this approach has allowed Finland to be the first to take advantage of the emerging new techno-organizational pattern, and the Finnish financial system to be with a high adaptation capacity to response to change in demand (Ornston, 2012).

The Finnish KBE was perceived as a national program of survival that has been shaped by networking and cooperation among social actors (e.g. trade unions, employer associations) (Knight & Routti, 2011; Schienstock, 2007). The accelerated performance of Finnish KBE model, and the inspired effective cooperation between industry and science, were driven by the threat of being trapped behind. The policy development implications were obvious in the ICT cluster, which was strengthened as a national strategic choice to advocate knowledge management deployment, and expand knowledge management to traditional sectors (Jafari and Akhavan, 2007) - in addition to policy development for high R&D expenditure, and high educated workforce (Schienstock, 2007). Human capital development in Finland is through technology oriented education with focus on higher education and tertiary education. The Finnish innovation policy has the flexibility to react to new challenges e.g. internationalization and global networking.

The Finish Innovation strategy focuses on building on strength rather than weaknesses, e.g. the aim of the centre of excellence programme is to focus on specific field of ICT and biotechnology research in universities to enhance knowledge creation and diffusion (Schienstock, 2007). The main challenge faces Finnish KBE model is that it is mainly depends on ICT cluster development (Jafari and Akhavan, 2007; Schienstock, 2007), and due to the rapid change in technology advancement, high adaptation of market change is required to survive (Schienstock, 2007). However, a major threat for the Finnish system is that the ICT cluster is dominated by global telecommunication companies in the country, in which if their business fail for any reason, the system could collapse (Schienstock, 2007).

The most apparent KBE characteristics in the Finnish case is the high coordinated model among different actors, driven by endogenous driver of national survival need. In addition, the size of the country promotes its proactive approach and adaptation to change in the market. Effective networking led by global market players imposed world-class standardization in the Finnish policy development system and increased the expectations of high skilled workers.

### 3.2.3 Denmark

Denmark is more open to international markets than other countries, and the Danish economy is characterised by its orientation towards development of skills and continuous innovation (Parker, 2004). Furthermore, it is ranked as a highly organized economy in corporatism and coordination measures. Denmark has less capital-intensive industries compared to Finland, therefore it requires less state intervention (Ornston, 2012). The specialisation in high-technology strengthened the skill base in the country (Parker, 2004). Denmark can also be distinguished from the coordinated model by two characteristics: the negotiated nature of its economic system, and its strong system of vocational training (Parker, 2004).

After World War II, the Danish economy has relied on cooperation that focuses on autonomous industry labour negotiations to supports more generous social policies. The utilization of industry-labour cooperation explains the achieved success by the knowledge-based investments that support employment growth and reduced deficiencies in capital-intensive, high-technology industries (Ornston, 2012). The locally developed and coordinated policies have influenced business innovation, and KBE performance, which is characterized by high skilled development and

knowledge specialisation in the industry sectors (Parker, 2004). Furthermore, the cooperation among societal actors (e.g. trade unions, employer associations) and firms plays a significant role in KBE development (Ornston, 2012). Danish education is health and welfare oriented and due to the highly qualified, technically skilled, and well educated labour force, Denmark has succeeded in attracting international venture capital, and building high technology sectors (Parker, 2004). Furthermore, the state developed system of vocational training to ensure a supply of highly skilled workers. This creates a pattern of learning and innovation that depends on personnel and expertise networking. Consequently, the levels of knowledge sharing and transfer increased via the interactions of social networks and trade associations (ibid.). Therefore, the Danish model is based on human capital development, and coordinated for effective networking; same characteristics demonstrated in the KBE models in Sweden and Finland as outlined in Figure 1.

**Figure 1:** KBE Characteristics Demonstrated in Advanced KBE Models

Country	Sweden	Finland	Denmark
Aspects			
KBE leading sectors (or patterns)	<ul style="list-style-type: none"> <li>R&amp;D &amp; knowledge intensive multinational firms</li> </ul>	<ul style="list-style-type: none"> <li>Standardized policy development in innovation</li> <li>Superior position in high-technology industries (e.g. telecommunications, ICT)</li> </ul>	<ul style="list-style-type: none"> <li>Skills development and continuous innovation</li> <li>Highly ranked in corporatism and Coordination measures</li> </ul>
Policy development implications	✓	✓	✓
Human Capital development	✓	✓	✓
Performance tracking system	✓		
Change Adaptation	✓	✓	
Endogenous drivers	✓	✓	✓
Networking	✓	✓	✓

The Swedish, Finnish, and Danish cases offer several lessons for policy makers, and suggest that the cooperation among societal actors (e.g. trade unions, employer associations), and firms continues to play significant role in contemporary capitalism even within an increasingly high-technology economy (Ornston, 2012). It confirm that the development of KBE is beyond improving a concurrence across nations, it's rather associated with distinctive patterns among nations that are linked to a national business system in a long term foundation (Parker, 2004). Therefore, a specialised national KBE is suggested, to attain a KBE integrated cluster across nations in which is adding value (ibid.). In relating KBE to countries' size, the findings from the cases agree with Tan and Hooy (2007) findings: that small countries have excelled in the efficiency of resource utilization to develop KBE, and that these countries are not based on market-oriented reform and emphasis on investments in high-quality infrastructure, human capital, and research in addition to high knowledge intensive inputs (Ornston, 2012). More interestingly, the role of endogenous drivers in accelerating performance of KBE was demonstrated by the cases, represented in growth need, survival need, or a threat of being trapped behind.

#### 4. KBE Theoretical Paradox

Theorists from different disciplines: economics, strategic management, and communication, have developed and applied theories to examine the new era of Knowledge Economy. Some theories that have emerged to provide an explanation of KBE dynamics are: evolutionary theory of economic change (Dosi, 1982; Freeman et al., 1982; Nelson and Winter, 1982), new growth theory (Lucas, 1988; Romer, 1986), national innovation systems theory (Freeman, 1987; Lundvall, Bengt-Åke, 1995; Lundvall et al., 2002; Nelson, 1993; Nelson et al., 1995), triple helix theory (Etzkowitz and Leydesdorff, 2000; Leydesdorff, 2006, 2012), the integration strategy of Knowledge-Based View (KBV) as a foundation of the Economic Organization (EO) (Foss, 2005), and the theory of Experimentally Organized Economy (EOE) and Competence Bloc (Johansson, 2010). Each theory focuses on a single or multiple dimensions of KBE. Dang and Umamoto (2009) classify five theories on a scale of how each theory views knowledge; as an asset, relation, or capability, as outlined in figure 2. They also argue that knowledge as a capability would be the most appropriate view for a theoretical explanation of KBE in a state and highlight the need for a concept of capability at a national level.

However, based on its characteristics, KBE is the outcome of a collective effort (Thurow, 1999). Therefore, the offered explanation of KBE dynamics would be, most probably, expected to provide an integrated arrangement of multiple views and dimensions rather than a single view or dimension. Thus, in this section we would focus on the theories that, to some extent, explain KBE as an integrated system followed by a theoretical discussion on the main findings and its implications from strategic management view combined with an economics and communication notions.

**\*Figure 2:** A classification for emerging theories in KBE suggested by Dang and Umemoto (2009)

Views of Knowledge Economy	Knowledge as Asset	Knowledge as Capability	Knowledge as Relation
Theories of Knowledge Economy	New Growth theory (Romer, 1986, 1990; Lucas, 1988)	Evolutionary Theory of Economic Change (Nelson and Winter, 1982)	Triple Helix Theory of Knowledge Economy (Etzkowitz and Leydesdorff, 1995a, 2000b; Leydesdorff, 2006)
	Technology Gap, Knowledge Gap theory (Abramovitz, 1986; WB, 1999; Baskaran and Muchie, 2006)	National Innovation System Theory (Freeman, 1987; Lundvall, 1992; Nelson, 1993)	

\*Source: (Dang and Umemoto, 2009)

In the evolutionary theory of economic change (Nelson and Winter, 1982), the economy is perceived through an evolutionary process, while firms act like living organisms in which their capabilities are heterogeneous (Nelson and Winter, 1982). Like “genes” in the living organisms, “firms” capabilities are repeatable “routines” that occur while performing businesses, but whenever it is beneficial, firms will follow other firms’ routines, and thus innovation will happen as a call for suggested change(s) to the previously adopted routines (Nelson and Winter, 1982). Firms benefit mostly from the continuity of such process when the firms’ capability grows to a higher level, to increase its economic growth level accordingly (ibid.).

The KBE is explained in the New Growth theory (Romer, 1986; Lucas, 1988), which includes the change of technical knowledge in the traditional production function of the economy from a neoclassical economics view. The New Growth theory explains the causality of conscious economic activities, which are endogenous rather than exogenous, in knowledge change. On the other hand, it also highlights the important externalities of knowledge and emphasizes on the integration between both effects, endogenous and externalities that could provide knowledge with a sustainability advantage for long-term economic growth.

In the context of the national innovation system (NIS) theory (Lundvall, Bengt-Åke, 1995; Nelson and Winter, 1982) an innovation system of an economy results from the interactions among various actors, in which it determines the process of innovations’ creation, modification, and diffusion in the system. Lundvall (1995) suggests that the actors in the innovation system are the concerned organizations of knowledge exploring and searching as well as all related divisions of economic and institutional structure such as the financial, production, and marketing systems. However, the rational actor for developing the national innovation system and the economy is supposed to be the national state.

The Triple Helix theory (Etzkowitz and Leydesdorff, 2000; Leydesdorff, 2006) considers university, industry, and government as the main institutions of the knowledge-based economy, and are expected to involve in a double

layered network: institutional layer and functional layer. The system's retention and reproduction require recombining and reproducing three functions: (1) the generation of economic wealth, and (2) the generation of scientific and technological novelty, while (3) locally controlling the two functions at a system level. The dynamics of the whole system are driven by the (a) frequent interaction between the main three institutions as helices and (b) the interaction between the two layers: institutional and functional layers. Consequently, the knowledge-based economy basically emerged as the three helices of a second order interaction that is resulted from the past compromises between functions and institutions (Leydesdorff, 2006).

Foss (2005) suggests to follow an "integrationism" research strategy in considering the strategic theory of the firm for the era of KBE, in which he recommends integrating both theories: Knowledge Based View (KBV) (Teece, 2000, p.29) and Organizational Economics (OE) (Barney and Ouchi, 1986). Integrating both theories increases their potential to be entitled as a strategic theory of the firm in the new era of KBE dynamics (Foss, 2005), since a candidate theory could not be considered as a strategic theory of the firm unless it is comprehensive enough to address the four issues: (1) the existence of the firm; (2) the boundaries of the firm; (3) internal organization; and (4) competitive advantage, while each of the two theories, KBV and OE, covers different aspects of these four issues (Foss, 2005). The principle of KBV expressed in the firm's ability to create, transfer, assemble, integrate, protect, and exploit knowledge asset (Teece, 2000, p.29), while OE combines the agency theory and transaction cost economics (Barney and Ouchi, 1986).

In the theory of experimentally organized economy (EOE) (Eliasson, 1988, 1991; Eliasson and Eliasson, 1996), the economic growth is embodied in an evolutionary process of discovery, use and selection of knowledge, in which uncertainty and unpredictability practically occur in all economic activities. The theory suggests the extremely large scale of the information and the bounded rationality of economic actors (Johansson, 2010), while the competence blocks theory (Eliasson, 1988, 1991; Eliasson and Eliasson, 1996) is about determining the necessary minimum set of agents with competencies that are different yet complementary in which are required for generation and commercialization of new combinations. In the competence blocks the key aspect for economic performance is the incentive given to the actors by the institutions. The two theories were developed separately; EOE was developed first for analysing the economy in a more realistic way compared to general equilibrium theory for example, while the competence bloc was developed afterward for studying industrial development via understanding the selection process of innovations and firms in an experimentally organized economy (Johansson, 2010). The realization of the actors' bounded rationality, and how it could probably create a decision-making process that is experiments-based, provide the foundation for the development of competency bloc thereafter (ibid.). Johansson (2010) suggests the integration of the two theories, namely EOE and Competence bloc, to one single theory that focuses on resource allocation, namely for new knowledge production and utilization. By linking the theory to Schumpeterian concept of new combinations, Johansson (2010) builds a link among individual firm activities, industrial dynamics, industrial transformation and macroeconomic performance.

Although the component of knowledge was highlighted in the theories discussed above, they vary in perceiving knowledge component. Some theories address knowledge as a capability, while other theories consider knowledge as an asset, or networking requirement. Furthermore, some theories view knowledge in more than one view: asset and activity, or capability and networking. Moreover, within the integrationism strategy, KBV also has a list of limitations as a theory of EO in (1) accounting for the existence of the firm, (2) illustrating economic organization, and (3) methodological perspectives represented in the lack of clarifying micro-foundations, modelling heuristics, and the forward predictions (Foss, 2005). In the theory of Experimentally Organized Economy and Competency Bloc, the contribution of new growth theory basically focuses on knowledge as a source of growth via Research & Development (R&D), which is considered as a basic representation of the knowledge production function, economic relation between R&D and innovative output (Carlsson and Eliasson, 2003), however, the transformation process of knowledge into economic growth is neglected. In addition, EOE and Competence Bloc theory is also limited to the private sector and is negative to the ability of public sector to generate value of its own or different subsidies (Johansson, 2010), it also limits the underpinning determinants of economic growth to the private property rights of institutions-as a competition platform for economic actors. Therefore, EOE and Competence Bloc theory emphasizes more on competition rather than cooperation and sharing gains for regional growth. They mainly relate their indicators to GDP for economic growth, which is not necessary reflecting the related indicators to the efficiency of knowledge management and resource allocation and utilization processes. The same applied to the new growth theory where the theoretical scope is mainly related to macro-economics and relate the economic growth to GDP calculations, while the scope of the national innovation system focus mainly on the innovation process as a part of KBE and not the whole system of KBE at a national level.



The conceptual background drives our focus in the following analysis to be on theories that are more related to the strategic management field and address knowledge in its theoretical context as an asset, activity or networking requirement. Therefore, due to the limitation of different theoretical focus by the theories: new growth theory and national innovation system theory, these two theories are excluded from the analysis. In the following section, we address the theoretical lens of knowledge component and how it is perceived by related theories to KBE.

4.1.1 Theoretical lens of Knowledge component within KBE

The analysis is mainly focus on theories that perceive knowledge as an asset and activity in (1) integrationism strategy of KBE and EO Theories, and as an asset in (2) theory of EOE and Competence Bloc, and as a networking requirement in (3) Triple Helix theory. The findings of the analysis in Figure 3 show that despite the differences among these three theories in perceiving the component of knowledge within its theoretical context, they all acknowledge the process of knowledge allocation and utilization as a main contributor to determine the value of knowledge asset that leads to competitiveness.

**Figure 3:** Comparison among Related Theories in perceiving Knowledge component, and acknowledging the process of Knowledge allocation and utilization.

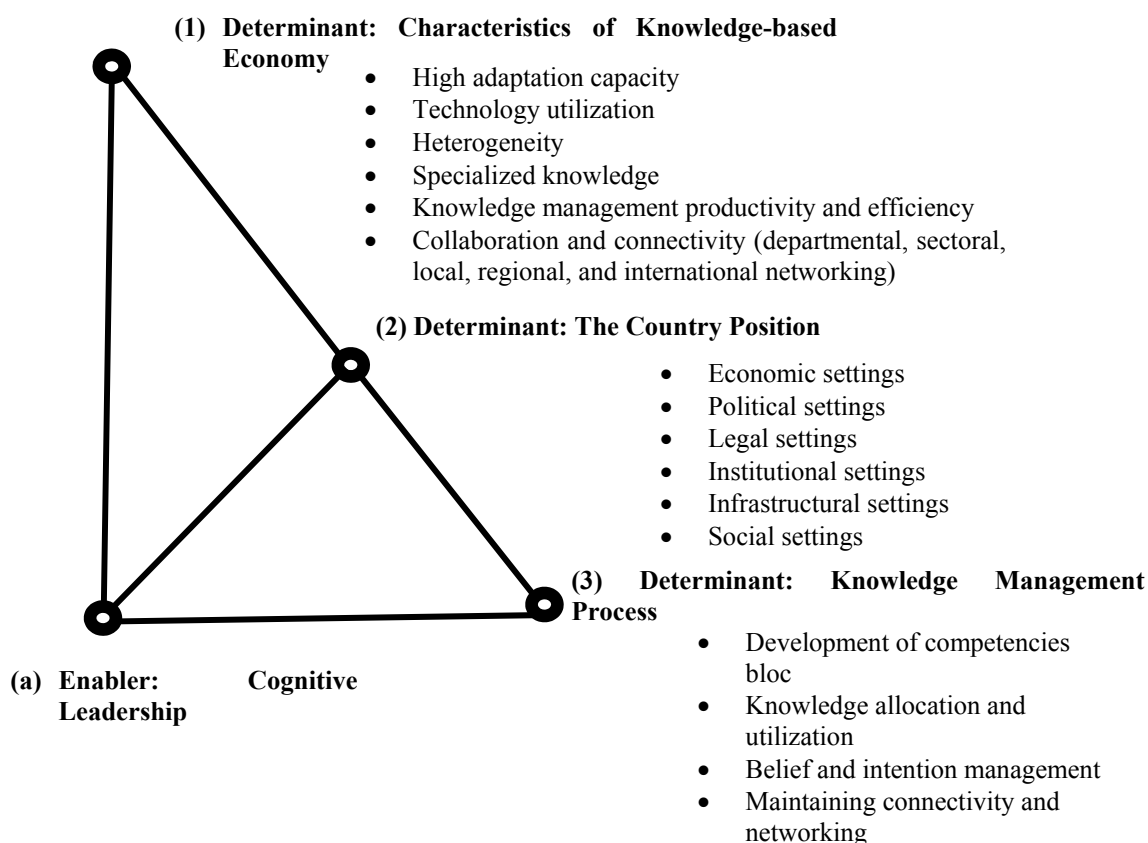
Theoretical Lens \ Theories	Integrationism Strategy of KBV and EO	the theory of EOE and Competence Block	The Triple helix theory
Knowledge as an Asset	✓	✓	
Knowledge as a networking requirement and outcome			✓
Knowledge as a cost based activity	✓		
Knowledge as a utilization activity	✓	✓	✓

Knowledge is perceived as an asset in both theories (1) Integrationism Strategy of KBV and EO, and (2) the theory of EOE and Competence Block, however in different views. Integrationism Strategy of KBV and EO perceives knowledge as an asset and cost based activity. It considers that the value of knowledge asset to the firm competitiveness is subject to the efficiency of utilization process of create, transfer, assemble, integrate, protect, and exploit knowledge asset. The utilization process is also led by selecting cost efficient activities that might involve social relations (Foss, 2005). While the theory of EOE and Competence Bloc perceives knowledge as an asset (or source) for evolutionary process. Its theoretical argument is that knowledge is tacit in its sense, and market experiments is the only approach for knowledge to be codified and evaluated as new knowledge, whereas the market opportunities is part of the state space of all combinatorial possibilities. Both business opportunities and state space are infinite in the long term based on 1) the number of possible combinations, and 2) the capability of state space to expand via learning and exploration process. Although the competence bloc that identifies the minimum required set of competencies necessary to adequate successful utilization of profitable new combination in the state space, it is worth mentioning that the competence bloc is formed naturally in the market by experiments and too hard to be planned (Johansson, 2010).

In the Triple Helix theory, the knowledge base is considered as an “explanadum” rather than as an “explanans” for its economic implications as explained by Leydesdorff (2006) and represents a complex system of social relations and coordination. Knowledge plays an essential role in codification process of meanings. Its role is also in assessing in second layer of codification where commercialization could be involved for ‘Codified Knowledge’. Therefore, a knowledge-based system runs in recursive circles operations that are become increasingly selective, in ‘information retaining’ process, in each subsequent circle. The continuity of theoretically informed deconstructions and reconstructions assist the development of knowledge base of a social system over time. Thus, a knowledge-based economy is always in change due the interaction in different levels (Leydesdorff, 2006).

Despite the different views each theory has in perceiving knowledge component, undeniably the three theories acknowledge the process of knowledge allocation and utilization within their theoretical context. Integrationism Strategy of KBV and EO considers that the value of knowledge asset to the firm competitiveness is subject to the efficiency of utilization process of create, transfer, assemble, integrate, protect, and exploit knowledge asset. Moreover, the utilization process is also led by selecting cost efficient activities that might involve social relations (Foss, 2005). In the theory of EOE and Competence Bloc highlights the economic concern with resource allocation issues represented in a gap of coordination, and considers economic growth as an evolutionary process of discovery, use and selection of knowledge. In the Triple Helix theory, the process of knowledge allocation and utilization takes a broader concept of network organizing and arrangements. A complex view of dynamics' interaction is expected to occur when three dynamics freely interact in one system, thus Leydesdorff (2006) argues that the layout of governance, market, and knowledge production, as three feasible degrees of freedom, could be modelled in terms of a Triple Helix of government, university and industry relations. In the geographical dimension, the variable that instantiates and organize systems of the model is governance, the main conveyer of economic production and exchange is industry, while the role of organizing knowledge-production function is played by universities. The following section proposes the conceptual model of the main determinants of KBE development and presents the related conceptual and theoretical arguments that would support the different aspects of the conceptual model.

#### 4.2 Conceptual Model: Main Determinants and Enabler of KBE Development at National Level



**Figure 4:** Conceptual model of the main determinants and enabler of KBE development at a national level

Understanding the main determinants of KBE framework at a national level can guide practitioners and policy makers to an effective implementation of KBE. The proposed model emphasizes on understanding KBE characteristics within a frame of national strategic choices to increase the value of knowledge asset at national level. Furthermore, the networking type and strength among main players in KBE ought to be aligned with this strategic frame, therefore, Knowledge-based strategies among countries differ (Ornston, 2012). An efficient and effective knowledge management process is key to achieve KBE function i.e. Human capital development and maintaining national knowledge asset value. To achieve KBE ultimate function, an optimal approach is suggested in the model. The approach mainly considers both adopting KBE characteristics and maintaining the national strategic choices related to the country position. This approach provides the lens to view and assess the performance of KBE processes, mechanisms, and progress. Therefore, the position of a country in different settings are exposed in the model e.g.

economic, political, legal, institutional, infrastructural, and social settings. KBE characteristics need to be acknowledged within the country settings to attain knowledge management process efficiency. Knowledge management consists of the functions: (1) Development of Competence Bloc, (2) Knowledge allocation and Utilization, (3) Belief and intention management, (4) Maintaining connectivity and networking. However, the main enabler for achieving KBE ultimate function via its main determinants is cognitive leadership. The conceptual model is outlined in Figure 4.

Although financial returns would undoubtedly represent an aspect of KBE outcome, yet the focus on the characteristics and the ultimate function of KBE would enable effective development of KBE framework to achieve its ultimate function. The important return of KBE that would lead to sustainable financial outcome is human capital development, since it is KBE ultimate function (Curwell et al., 2005; Knight & Routti, 2011; Yigitcanlar & Lönnqvist, 2013; Powell and Snellman, 2004). Achieving KBE ultimate function requires meeting its characteristics and developing KBE related key performance indicators around these characteristics. The addressed KBE characteristics in the literature vary and differ, however based on the study scope and focus the related KBE characteristics are (1) high adaptation capacity, (2) advanced technology utilization, (3) heterogeneity, (4) specialized Knowledge, (5) knowledge management productivity and efficiency, and (6) collaboration and connectivity at different institutional horizontal and vertical levels.

The country position in different settings is a main determinant of KBE framework to achieve its ultimate function. The political settings and country stability can affect the feasibility of developing a KBE or any other economic activity. Furthermore, the political relations and mutual interests among countries could draw the networking channels in the KBE system. The economic settings such as the natural resources, the financial capital, knowledge capital, mutual interests and relations with other countries, trade and Investment (Free Trade and Foreign Direct Investment) have their impact on the specialized knowledge portfolio in a country, and on mapping the connectivity and networking among institutions with other countries in collaboration events. Furthermore, finding related legal settings enable the implementation of KBE processes e.g. HR law and property rights could empower the process of knowledge management and knowledge worker. The infrastructural settings reflect the development of a country indeed. The availability and advancement of related infrastructure highly impacts KBE implementation. Some examples of the KBE related infrastructure are, and not limited to: telecommunication, transportation, scientific facilities for R&D and Education. The institutional settings strongly determine KBE framework and function. Institutional mechanisms in implementing KM process could indicate the levels of effectiveness in adopting KBE characteristics, However, more exposed by other country settings (e.g. political, economic, legal, and infrastructural) that have its impact on the institutional setting of a country in adopting KBE characteristics and implementing knowledge management process. The institutional setting could be summarised in heterogeneity levels, adaptation capacity, connectivity and networking, strategic alliance (Yigitcanlar, 2009b), expectations setting & timeliness (Leydesdorff, 2006), technology utilization, and knowledge management and governance. Furthermore, KBE is considered as a social system by the analysis offered by Leydesdorff (2006) and Foss (2005). The social settings in a country could determine the KBE framework from different perspectives: ideological legacies, heritage and wisdom, history and lifestyle, religion and beliefs, and the openness to other cultures.

Knowledge management is acknowledged as the main underpinning process of KBE ultimate function (Benner, 2003; Hvidt, 2015; Jafari & Akhavan, 2007; Knight & Routti, 2011; Schienstock, 2007; Schilirò, 2012; The World Bank, 2012; World Bank Institution, 2007; Yigitcanlar & Lönnqvist, 2013; Yigitcanlar, 2009; Powell and Snellman, 2004). Mainly the role of KM process in the proposed model is to develop identified competencies aligned with (1) national strategic choices to a country position, and (2) the competencies suggested by KBE characteristics such as entrepreneurship, R&D, and future oriented mentality that could act in future context (Leydesdorff, 2006). Furthermore, the knowledge management role could include knowledge allocation and utilization by ensuring the appropriate specialization for the right positions and utilizing the available knowledge asset to fulfil the need in related events. This also could maintain connectivity and networking across institutions within and beyond a country borders to maintain mutual interests. Authors such as Leydesdorff (2006) and Foss (2005) highlighted KBE as a social system which its successful implementation dominated by the individual's beliefs and intentions. Thus, one of knowledge management function in the model is belief and intention management.

Cognitive leadership is defined as the ability to resolve coordination problems by influencing beliefs, in which includes both approaches: conceptualization and explanation (Foss, 2005). Foss (2005) highlights the leader's ability to influence on beliefs for revolting coordination issues more effectively compared to other people due to the associated privilege to his position in followers' mind that increases the probability to follow him. The leader's announcement of

the strategic direction is effective in resolving underpinning coordination problems since it creates a belief structure that approximates common knowledge (Foss, 2005).

## 5. Conclusion

The lessons learnt from leading economies in KBE implementation, and the theoretical premises based on perceiving knowledge component as an asset, activities and networking contribute in drawing this paper's main argument. This paper argues that KBE ultimate function is human capital development to increase the value of knowledge asset at national level, knowledge management is the main underpinning process of KBE ultimate function, and the main determinants of KBE development and implementations at a national level are: (1) the consideration of KBE characteristics, (2) the consideration of the country position in different settings, and (3) the consideration of knowledge management process, while cognitive leadership is the enabler of the three main determinants for effective development and implementation of KBE ultimate function. Therefore, the nature of human capital needs to be considered in the implementation of knowledge management process via belief and intention management as a main driver of KBE function. This calls for cognitive leadership, represented in the ability to resolve coordination problems by influencing beliefs, in which includes both approaches: conceptualization and explanation (Foss, 2005). Moreover, Leadership is vital in maintaining KBE characteristics adoption in different country settings to ensure enabling knowledge management process and empowering knowledge worker within strategic alignment. Therefore, setting the key performance indicators around KBE characteristics is more reflective, to KBE ultimate function, than the financial indicators such as GDP etc.

The conceptual model outlines KBE main determinants and enablers to guide policy makers in developing KBE framework based on national strategic choices for a country's competitive position. It suggests formulating policies and regulations that acknowledges KBE characteristics and national strategic choices in the different settings of a country position. This will assist in developing specialized KBE for a country's national competitiveness, and will enable knowledge management process to fulfil the ultimate function of KBE, human capital development. The model highlights the role of cognitive leadership, within the addressed context, as a main enabler for achieving KBE ultimate function via its main determinants.

Belief and intention management emphasizes on some factors that would have an impact on the efficiency of Knowledge Management process. Some factors would act as accelerators (e.g. transparency and governance, fairness in distribution of opportunities, knowledge allocation and utilization) and others would act as a challenge to overcome (e.g. KBE heterogeneity). This highlights the relation between KBE and Moral Economy (James and McGill, 2016; Knox-Hayes, 2015) within policy development and implications that promote trust (Adler and Adler, 2001; Zanini and Musante, 2013). This relation is subject to exploration for future research. Furthermore, case studies are required to empirically validate the proposed conceptual model of KBE development at a national level, the main determinants and enablers.

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