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DEVELOPMENT OF HUMAN-CENTRIC INNOVATION ECOSYSTEMS THEORIES

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Summary. *Innovation has become omnipresent especially in today's technologically driven world. For developed economies, it is termed as cognitive enhancement 'technology' for improving humanity innovative abilities, and the 'engine of growth' or 'creative destruction'. Recently, the concept of human capital started to feature strongly as an essential part to production and worthy of examination and economic consideration. There are many dimensional facets of innovation including the factors that foster its development, ideas and the processes that drives innovation. This study will explore and analyze the role of the human factor and evolution of human-centric innovation ecosystems.*

Keywords: *Human-centric innovation, innovation ecosystems, human capital.*

1. Innovation Development

Modern day innovation primarily developed its roots from evolutionary economics literature. In analyzing innovation, an understanding of its history is essential. Furthermore, it is perceived that innovative capabilities are developed through accumulating knowledge from complex learning systems[1]. Innovation processes are shaped by social contexts. Social conditions do indeed affect innovation change over time and varies across productive activities which is why the *"theoretical analysis of the innovative enterprise must be integrated with a historical study".*[2]

From a historical stance, Godin contends that innovation has originated from different terms including 'novelty' (arising from human creativity), 'creativity' (this mainly comprise of three concepts and their derivatives: Imitation → Invention → Innovation) and a 'break with the past' (although on the other hand, innovation could represent a continuity with the past). While these terms nowadays are synonymously used, more importantly the former is based on secondary sources while the latter on primary sources. The primary source of innovation primarily constitutes original research, theories and to a greater extent new inventions. Therefore when viewed from several perspectives, a sociologist would define innovation "as an invention that is used and adopted" while for an economist "innovation is invention that is commercialized". While many have accounted for the way innovation is viewed, the term has evolved throughout the centuries into an industrial and economic context.

2. Innovation Ecosystems

Innovation development has indeed evolved from the humble beginnings of the industrialized era into the present technologically driven world economy. However, the historical interpretations of innovation processes from the different phases of industrialization, starting from the 'first industrial revolution' in Britain in 1760-1850 to the 'third industrial revolution' after World War II includes technological innovative activities from 18th-century Great Britain to the organized industrial R&D departments within the firms during the early 20th century. Although innovation is presumed to be a relatively recent phenomenon, the main argument is that innovation has always existed, though universally understood as technological innovation. In recent times other terms such "social innovation" which is defined according to Deutsch et al[3], as major advances in social sciences, or policy/institutional reforms for the betterment of society[4], or solutions to social needs and problems coming from the community sectors among others[5]. Recently, "institutions" were re-labelled as "social technologies"[6] as a rhetorical move, however

1 Bruland, K., and Mowery, D. Innovation Through Time- Globelics Academy. 2008.

2 Lazonick, W., "Innovative Enterprise and Historical Transformation", *Enterprise and Society*, Vol. 3. 2002, p. 3-47.

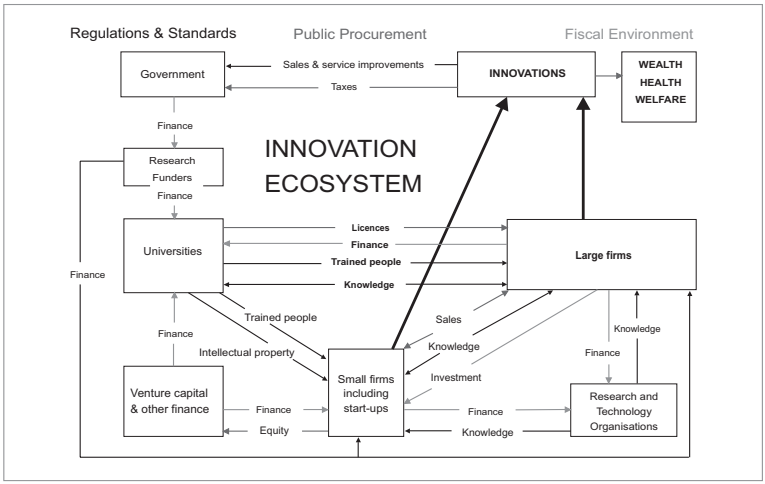
3 Deutsch, K.W., Markovits, A.S. and Platt, J. Advances in the Social Sciences, 1900-1980: What, Who, Where, How, Cambridge (Mass.): Abt Books. 1986.

4 Gabor, D. Innovations: Scientific, Technological and Social, Oxford: Oxford University Press. 1970.

5 Goldenberg, M. Social Innovation in Canada, Canadian Policy Research Network, Report no. 25, Ottawa. 2004.

6 Autio, E. and Thomas, L.D.W. The Oxford Handbook of Innovation Management. Edited by Mark

economists are more inclined towards the term "technology" rather than "institution" when it comes to innovation. The Organisation for Economic Co-operation and Development (OECD) Oslo Manual has expanded the definition of innovation to include "organizational and marketing innovation", a term that is found to be only limited to firms[7]. Another definition for innovation from the intellectual point of view, is the applying of new ideas to products, processes, or other aspects of the activities with a firm or institution that result in 'value-added' processes, or 'value-creation'[8]. Value creation or value-added will therefore in a general way provide higher value added for firms or customer benefits to clients. Innovation at the organizational level for firms and companies can result in organizational changes within the firm or institutions and can be classified as a process innovation. On the other hand, product innovations are tangible manufactured goods, or intangible services, or a mixture of both systems. While innovation can be viewed as a novelty resulting from creating or improving existing processes, or the generation of new ideas then question is how much novelty is required to identify any change as "innovation". Innovation should not be confused with invention, as an invention is the enhancement of current knowledge that does not instantaneously become novel product or process. The key feature of innovation that distinguished innovation from invention is that it happens when new products and processes are produced as a result of either combining existing ideas or the application of new knowledge to solve a problem. Diagrammatically, the stages of innovation processes that is characteristic of innovation eco-systems is shown in Figure 2.1, below:



Dodgson, David M. Gann, and Nelson Phillips. Business and Management, Entrepreneurship, Social Issues. 2013.

7 Godin, B. Innovation: The History of a Category. Project on the Intellectual History of Innovation Working Paper No. 1. 2008.

8 Greenhalgh, C., and Rogers, M. (2010) Innovation, Intellectual Property, and Economic Growth. Princeton University Press, *Business & Economics* ,Jan 24, 2010.

Figure 2.1. Innovation ecosystem: Improving the framework conditions for R&D;
Source: Georgiou, 2015

From an economic stance, relevant knowledge is defined as "*a body of scientific evidence and human expertise that is deemed useful in the production and supply of commodities, invention and design of new products as well as processes*"[9] *Ibid. When knowledge is 'embodied in an individual' it is defined as human capital, a valuable asset that is very distinctive and different from physical capital*[10] *Ibid. The quantity of human capital is increased from attaining new skills and knowledge through education and training. On the other hand, technology, a term that often goes 'hand-in-hand' with knowledge, is a process of incorporating a set of production techniques used to design, make, package, and deliver goods and services in the economy*[11]*, or the application of knowledge stock to production activities. When technology is used to determine productive capabilities, this is termed as 'process innovation' as it involves the addition of other inputs. On the other hand, inventions and new discoveries that are added to existing knowledge applied to the production process are termed as product innovations.*

3. Innovation Ecosystems

The importance of the individual or human factor in the innovation process is consistently acknowledged by scholars, with more emphasis placed on its particular qualities[12]. The innovation process is a 'people process', where successful innovations of the past were a result of the human factor fulfilling a variety of roles, which in most cases are informal[13]. Traditionally, it is common for innovative companies to focus on advanced, technological products as the vision of success; however, this perspective is wrong when it comes to innovation, as the focus of innovation should be on people or the human factor of innovation[14]. Innovation in its true sense is not created by technology; it is rather created by people, usually "a process undertaken by people to create new value for people". When one refers to the human factor in innovation, developing talented human capital is the first step. This can be done primarily through attracting talented human capital from other regions of the world and then training and employing them in various innovation activities. Western countries such as the United States of America have successfully attracted prominent persons or talent from all over the world, and have simultaneously created an ecosystem in which innovation is a top priority[15]. Human

9 *Supra* note 8, p.3.
10 *Ibid.*
11 *Ibid.*
12 Rothwell, R., Freeman, C., Horlsey, A., Jervis, V.T.P., Robertson, A.B. and Townsend, J. SAPPHO updated: Project SAPPHO phase II, *Research Policy*, Vol. 3, 1974, p.258-91.
13 Rubenstein, A.H. Factors influencing success at the project level, *Research Management*, Vol. 19, No. 3. 1976, p.15-20.
14 Fujitsu Technology and Service Vision, Report. 2014.
15 Cornell University, INSEAD, and WIPO. The Global Innovation Index 2014: The Human Factor In innovation, second printing. Fontainebleau, Ithaca, and Geneva. 2014

centered innovation in simple terms means solving problems through aiding the human-factor, people to succeed in attaining certain goals.

Human capital plays a key role in the conceptual and implementation of innovation as well as the inter-organizational, national, and international diffusion of the innovation concept. Human capital is termed as a set of skills that increase the productivity of the worker within firms and ultimately the overall production process of nations[16]. Though it is difficult to specifically define the role of human capital in production processes, it is perceived as the stock of knowledge and skills that have a positive impact on economic output.

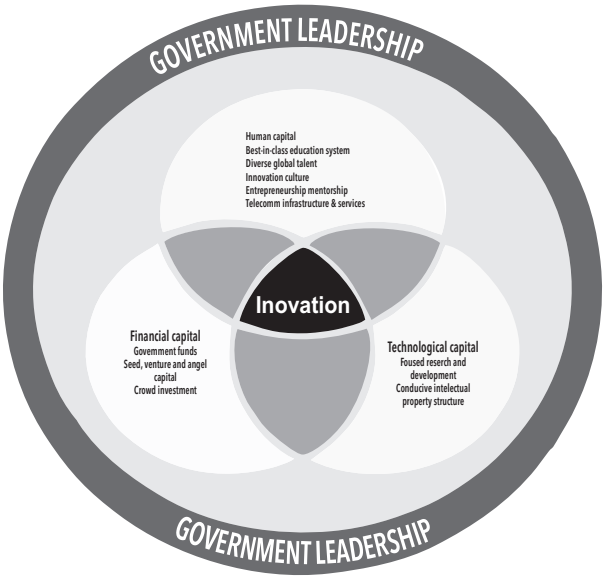


Figure 3.1. The pillars of innovation;
Source: Global Innovation Index, 2014

Innovation is highly dependent on individuals that are able to generate and apply knowledge and skills applicable to society and organizations at large. Although concrete links between specific skills and innovation are difficult to establish[17], the proposed connection between education and economic development should be developed through required mechanisms, and outcomes of this link remain a matter of debate'[18].

16 Becker, G. S. Human Capital, Chicago and London: The University of Chicago Press. 1964/1993.
17 OECD (Organisation for Economic Co-operation and Development). Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, Third Edition, Paris: OECD. 2005.
18 *Ibid*., p.1

In fact, due to the variety of skills and innovation, the difficulty in measuring human capital, innovation inputs and outputs, and lack of innovation-specific empirical studies contribute to limit these connections. According to literature, there is no correlation between a given innovation or technology and/or the demand for certain skilled workers. How a technology is deployed is mediated by a firm's strategies or work organisation methods. Figure 3.2 illustrates how the three main pillars of innovation, that is, human capital, financial capital and technological capital all contribute to the innovation process. The figure also shows how the concept of a human-centred innovation ecosystem can be advanced through developing the human capital aspect of the innovation. For a particular type of innovation to be implemented, training the workforce on that given innovation, implementing it in the production process and then later when it is consumed can give rise to incremental improvements to the original innovation[19].

4. Discussion and Findings

Change may result overtime but this is usually through extreme pressure, which sometimes leads to the extent where individuals would question whether it is feasible talking about changing culture to facilitate strategic change. Several scholars[2021] contends that it is the change of behaviours that matters the most where an innovation culture that is purely human-centric based altogether shapes 'the new paradigm' (see Figure 4.1). With innovation ecosystems, its evolution towards a human-centric innovation ecosystem is the most recent paradigm that encompasses a cross-organizational configuration where the human factor is positioned at the heart of innovation phenomenon. This paradigm incorporates a wide range of inter-organizational cultural networks, organizations, government and public policy and standards interconnected as the dynamic interactions created are only subjected to time and results. In explaining this framework, innovation positioned as intimate, with a close cooperation between the human-factor, its environment and potential technological capabilities. The key and most central feature of this paradigm are the evolving organic, diverse and symbiotic attributes, where the principle of synergy is central, through collaboration, all entities collectively achieve goals that are unattainable on their own. As ecosystems are complex adaptive systems, innovation ecosystem are no more less complex as it encompass invention/innovation, government, external and internal funding, culture, demand, infrastructural capital and technology that may function virtually or geographically traversing a number of ecosystems.

19 Toner, P. Workforce Skills and Innovation: An Overview of Major Themes in the Literature. 2011.
20 Anthony, P. Managing Culture, Buckingham: Open University Press. 1994.
21 Johnson, G. Managing strategic change – strategy, culture and action. Long Range Planning. 1991, p.25: 34.

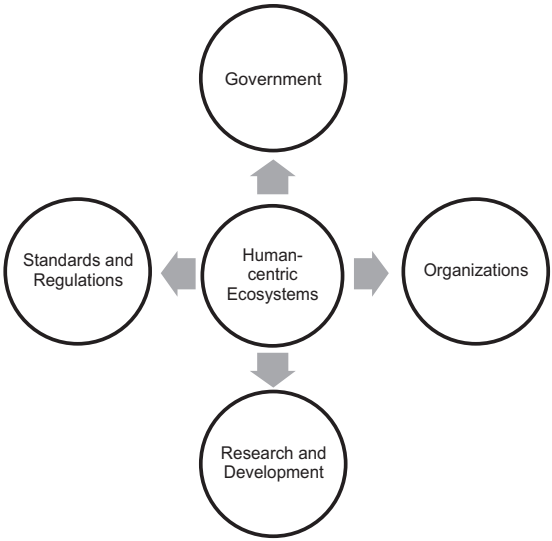


Figure 4.1. Human-centric Ecosystems.

From this point of view, useful innovation ecosystem strategies has developed to become more industrially and economically driven due to the new interest in the human factor. The human factor has also been an important and significant part of innovation, yet most often ignored. Scholars predict that investing in the human capital to harness more skills based-on-the job-training and education can foster and transform economies into high innovators. The entrepreneurial model, which purely recognizes that the human factor is the centre and the heart of innovation ecosystems, is also widely accepted as the key factor in organizational innovation as well. It is the 'role of the entrepreneur' or human factor that is often missing in many models of innovation. Even in a thriving, profitable organization, which during the years achieved innovation success, top managers have to be constantly reminded of responsibility to acknowledge and support 'innovation leaders' which in simple terms is the human factor or people who through exercising their initiative and the willingness to take on risks, ultimately creates innovation. Hence, the entrepreneurial model is more likely to create an innovation culture in organizations, where greater visibility of the role of the human factor is emphasized and supported as the creator of innovation in innovation ecosystems.

5. Conclusions

1. Throughout its history, innovation has been broadly defined as containing certain kind of novelty: artistic, scientific, technological, organizational, cultural, social or individual, has been the premise to many theories and recognized as the key feature of the inventor, scientist, entrepreneur or the firm.

2. From the institutional aspect, innovation is recognized as a key characteristic of the individual, as individuals are the creators of innovation. Therefore, it is necessary to analyze the economic aspects of innovation development from two main approaches- the knowledge economy (that is the development of specific ecosystems at the firm and the national levels) and through paradigm shifts. For the latter, paradigm shifts that chartered the way towards a 'human-centric based innovation ecosystem' came about as a result of several economic factors: the political and economic contexts, the industrial and consumer revolutions, the impacts of technologies on individuals and societies, technology as a source of economic growth and productivity and the institutionalization of technological invention through patenting and patent laws, and industrial development through R&D laboratories.
3. To a greater extent individual is the creator of innovation and from an economic perspective the originator of commercialized innovation that we are familiar with today. This is why it is necessary to develop a human-centered ecosystem, which focuses on the invaluable and most important factor of innovation – the human capital.

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Į ŽMOGŲ ORIENTUOTŲ HUMANOCENTRINIŲ INOVACIJŲ EKOSISTEMŲ PLĖTROS TEORIJOS

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Santrauka. *Šiandien naujovės skverbiasi visur, ypač atsižvelgiant į naujų technologijų galias pasaulyje. Tvirtos ekonomikos šalyse tokios naujovės vadinamos kognityvinės plėtros „technologijomis" - skirtomis žmogiškųjų inovacijų gebėjimų tobulinimui – arba „ augimo varikliu" ar net „ kūrybine destrukcija". Pastaruoju metu itin iškilo žmogiškojo kapitalo sampratos svarba kaip esminė gamybos dalis, jos tyrimų vertingumas ir jos ekonominė apskaita. Inovacijų aspektai svarstytini įvairiose dimensijose; tarp jų veiksniai, skatinantys inovacijų plėtrą, inovacijų idėjas ir inovacijas diegiančius procesus. Šiame tyrime nagrinėjamas ir analizuojamas žmogiškojo veiksnio įtaka inovacijų plėtrai ir Į žmogų orientuotų inovacinių ekosistemų raida.*

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Raktiniai žodžiai: *į žmogų orientuotos inovacijos, inovacijų ekosistemos, žmogiškasis kapitalas.*

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