

# Impact of the SECI Entrepreneurial Development Model on Entrepreneurial Activities: Unleashing Entrepreneurial Knowledge Creation Potential

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## Abstract

*This study uses a novel idea of the entrepreneurial development process using the SECI framework that addresses how implicit and explicit entrepreneurial knowledge is transformed into new startups. There are four distinct modes: socialization, externalization, combination, and internalization. This study analyzes the influence of the SECI entrepreneurial development model on entrepreneurial activities across the globe, utilizing the data set from the Global Entrepreneurship Monitor (GEM). The GEM data set is an extensive and dependable resource that provides information on all facets of entrepreneurial development, including entrepreneurial activity, attitudes, intentions, and contextual factors, including government policies and social environment. The study utilizes panel data and examines the underlying hypotheses. The findings reveal the underlying process of entrepreneurial endeavors through the SECI framework. This study enhances the existing body of knowledge on knowledge management and entrepreneurship by presenting empirical evidence that supports the validity and practicality of the SECI framework in various settings. The study has practical implications for policymakers, scholars, and practitioners aiming to cultivate a culture of innovation and entrepreneurship.*

**Keywords:** Entrepreneurial Development, Knowledge Creation, SECI Framework

## Introduction

Scholars and policymakers claim that the effectiveness of entrepreneurship in a region fosters socioeconomic development (Cohen & Winn, 2007; Hall et al., 2010; Hameed et al., 2023). The role of entrepreneurial activities is considered the backbone of the overall progression of socioeconomic development (Upase, 2022; Leitão, 2021). The process of entrepreneurial development largely depends on the entrepreneurial activities in a region (Ahmad & Bajwa, 2021). The entrepreneurial development process results in socioeconomic development, which helps explore and exploit new business opportunities (Audretsch & Belitski, 2017; Edelman et al., 2010; Nkechi et al., 2012). Both innovation and human capital development are the outcomes of entrepreneurial development (Baluku et al., 2016).

However, many countries have been facing challenges in entrepreneurial development, such as a need for more resources and competencies in accessing new business opportunities and, most importantly, knowledge management within a region related to entrepreneurial development. Scholars have identified knowledge development as directly linked with the development of entrepreneurial activities (Liao et al., 2022). However, the literature still needs to include how the entrepreneurial development process integrates and synthesizes all entrepreneurial activities (Dal et al., 2023). Production and management are widely acknowledged as crucial for innovation and

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success in society and businesses that are part of entrepreneurial ecosystems. The SECI model, devised by Nonaka and Takeuchi (1995), serves as a significant framework in this area, illustrating how information is converted from implicit to explicit forms. The transformation of information refers to floating new ideas of products and services crucial for entrepreneurial development. Each represents a unique phase in condensing ideas into valuable products and services. Therefore, analysis of the variables is critical for entrepreneurial development. The notion of entrepreneurial development operationalized the complexities embedded in entrepreneurial activities.

Entrepreneurs are always ready to create new knowledge and build insights by learning and experiencing risky situations. Knowledge creation is a dynamic process that involves the creation of new ideas that create creativity, adaptability, and competitiveness. Market gaps are identified that are the outcome of dialogs between entrepreneurs where they share explicit and implicit knowledge (Nonaka, 1994; Nonaka & Takeuchi, 1995). The SECI model helps to identify market gaps that are new business opportunities. The Knowledge creation process of entrepreneurial activities ensures the availability of finance, infrastructure facilities, social networks, and individual talent and competencies. The notion of knowledge creation for entrepreneurial development requires a detailed exploration of the available research in this field that is essential to explore entrepreneurial activities in a region.

The SECI model covers the entrepreneurial context. The SECI model explains the underlying knowledge creation process explained and proposed by Nonaka and Takeuchi in 1995. This model explains the process of knowledge creation, where tacit knowledge is converted into explicit knowledge. The SECI framework describes how ideas are condensed into new products and services, therefore can be used to explain the entrepreneurial development process. Knowledge sharing, collaboration, and shared goals and objectives work in a holistic way to determine the knowledge-creation process (Nonaka et al., 2022). These steps effectively explain socialization, externalization, internalization, and combination strategies that are implemented by individuals, resulting in a flourishing entrepreneurial development process.

Looking from a broader perspective, the SECI model can be envisioned from organizational to the broader context of industries and regions. Moreover, it covers all stakeholders who actively participate in the entrepreneurial knowledge-creation process. However, many scholars and researchers have challenged the effectiveness of the SECI model across different contexts (Glisby & Holden, 2002). This study uses the SECI theoretical framework to examine its empirical application in the context of entrepreneurship development. These shifts help in designing effective knowledge management practices that contribute to socio-economic development (Nonaka et al., 2022). The outcome of this study allows scholars to develop entrepreneurial development models that address sustainable activities, especially in underdeveloped economies. Scholars do limited work to conceptualize the SECI model to explain entrepreneurial development. For example, Bandera (2017) and Liberona (2019) use the SECI model framework in defining the knowledge creation processes that determine the entrepreneurial process within the context of SMEs. Furthermore, Shirokova (2013) explains the SECI to explain the process of entrepreneurship activities. Ngek (2017) further explores the relationship between entrepreneurial self-efficacy and the performance of SMEs.

To an extent, previous studies have tried to explain the entrepreneurial development process by using the SECI framework. There are multiple limitations to capturing the empirical evidence of the entrepreneurial development process. However, the empirical evidence is limited to capturing a holistic perspective of the SECI model. Scholars need to extend the current debate with additional contextual factors that capture generalizability in the entrepreneurial development process. This

gap needs to be explored further by investigating the impact of the SECI model on the entrepreneurial development process.

The current debate of sustainable entrepreneurial development and socio-economic progression requires to extend which insights that are significantly crucial for policymakers. In fact, the policy outcomes of the SECI model give a holistic view where all stakeholders collaborate on their knowledge, resources, and strategies. This phenomenon highlights the available opportunities that not only provide proactive indicators of entrepreneurial initiatives but also how to exploit those opportunities. In this regard, early-stage entrepreneurial activities give a signal of exploitation of new business opportunities that is the outcome of entrepreneurial settings within the context of a region along with personal attributes.

This study aims to comprehensively evaluate and analyze recent research to see the fundamental process that explains how the SECI model fosters sustainable entrepreneurial development. Moreover, this study examines contextual factors and their impact on the knowledge-creation process in global settings. The academic discourse of entrepreneurial development provides valuable insights to policymakers, practitioners, and scholars who are interested in identifying entrepreneurial potential using the SEI model. Finally, this study covers a significant gap in the relationship between entrepreneurial results and knowledge management.

Despite many studies on knowledge management, entrepreneurial activity, and the SECI model, our comprehension of the direct relationship between the SECI model components and early-stage entrepreneurial activities still needs to be improved. Previous studies have limited scope in explaining the knowledge-creation process in the domain of entrepreneurial activities (Nonaka & Takeuchi, 1995; Shane, 2003). The lack of existing research highlights the critical need for empirical investigations that establish a link between the practical implications of the SECI model and entrepreneurial development.

Previous studies have predominantly focused on the organizational context, with limited attention paid to the external entrepreneurial environment as a reflection of the knowledge creation and management processes explained in the SECI model. Due to entrepreneurship's multifaceted and intricate nature, a comprehensive examination of the interrelationship between knowledge transformation and early-stage entrepreneurial activities is necessary. This research contributes to the understanding of the complicated relationships between knowledge management and entrepreneurial outcomes (Egwakhe et al., 2022)

By investigating the entrepreneurial development debate, this research increases our understanding of how tacit and explicit knowledge can be utilized to achieve entrepreneurial endeavors. Furthermore, its objective is to provide policymakers and practitioners with a new perspective on how to foster dynamic entrepreneurial expansion (Shane, 2003). The research gap that is examined in this paper underscores the critical need to translate conceptual knowledge management frameworks, such as the SECI model, into actionable strategies that foster and support entrepreneurial endeavors in their nascent stages.

### **Research Question**

How does the SECI model of entrepreneurial development influence entrepreneurial activities, particularly with regard to total early-stage entrepreneurial activities (TEA) rates?

## Literature Review

### The Significance of Knowledge Generation and Administration

Information generation and management processes a crucial indicators for innovation and success in society and entrepreneurial development (Nonaka & Takeuchi, 1995). It plays a vital role in fostering entrepreneurial growth by enabling the conversion of implicit knowledge into explicit knowledge and vice versa (Nonaka & Takeuchi, 1995). The process above is crucial for fostering entrepreneurship within a particular geographical area (Spender, 1996).

The significance of knowledge creation and management has been extensively discussed in academic literature. Information management has its strategic importance because its effective utilization brings operational efficiency to organizations. Information management is different from knowledge management, as knowledge management refers to the deliberate and efficient way of converting information in a meaningful way. The effective utilization of knowledge resources generates knowledge, fosters innovation, and integrates novel ideas. Moreover, it has been recognized that the generation of knowledge is an essential aspect in enhancing the effectiveness in terms of identifying new opportunities and exploiting them to adapt to changing circumstances.

In the domain of knowledge creation, limited research is conducted explaining small and medium enterprises' role in knowledge creation (Gligah et al., 2020). This indicates that previous studies recognize the significance of knowledge management and development. The existing body of literature consistently underscores the substantial influence that knowledge management and development have on entrepreneurial endeavors. Additional research is required, particularly in the domain of entrepreneurial endeavors within particular sectors, in order to comprehensively comprehend and tackle the multifaceted facets of knowledge generation and management (Gu et al., 2022).

Nonaka and Takeuchi established a paradigm of the SECI model that is composed of the following four essential elements: Internalization, Socialization, Externalization, and Combination. Socialization encompasses the process of transmitting tacit knowledge through dialogues and interaction among individuals (Nonaka & Takeuchi, 1995). Externalization is the process by which implicit knowledge is converted into explicit forms. Further combination covers integrating divided components of knowledge (Nonaka & Takeuchi, 1995). Moreover, the process of translating explicit knowledge into tacit knowledge is called internalization (Nonaka & Takeuchi, 1995). These SECI framework elements indicate discrete stages in the information transformation process and are vital for entrepreneurial development in the form of early-stage activities (Chua et al., 2013). It is important to note that the SECI model's importance in understanding the knowledge creation process specifically in new startups has been underscored in numerous research investigations (Liberona et al., 2019).

Nonaka's SECI model is widely recognized as a comprehensive framework that enables understanding of the processes of knowledge management by which knowledge is generated. Although the model has been primarily employed in theoretical and descriptive contexts, its application in empirical research, particularly in the context of entrepreneurial development, has been restricted.

Knowledge management is the systematic method of obtaining, distributing, and effectively applying information (Barbier & Tengeh, 2022). Nonaka and Takeuchi introduced a comprehensive model for the knowledge-creation process (2000). They present a conceptual framework for knowledge creation. The knowledge generation process is classified by a spiral

pattern that originates from three fundamental elements. In a society, knowledge and the rapid creation of new knowledge are critical.

In addition to facts, knowledge comprises actions as well. Increased understanding can lead to measurable enhancements in product development and production processes. It can be employed to facilitate well-informed decision-making regarding product and service life cycles, competitors, customers, and distribution channels. Entrepreneurs generally exhibit a substantial reservoir of knowledge; they are compelled to produce novel insights via innovations to propel their enterprises forward. According to Crossan, innovation pertains to the procedure of generating or embracing a novel and advantageous notion or concept, which finds application in economic and social spheres. This encompasses the adoption and integration of novel ideas to improve offerings, markets, and services, in addition to establishing and utilizing new management systems and creating inventive production techniques (Crossan & Apaydin, 2010).

Entrepreneurship typically entails risk and pressure, as it needs more ability to compete with significant enterprises in terms of scale and resources. However, it provides an inherent benefit in generating knowledge. According to Nonaka and Takeuchi (1995), fluctuations within asocial dynamics that can stimulate a state of creative chaos, which in turn promotes and reinforces the personal dedication of individuals. Many major corporations are endeavoring to cultivate an environment characterized by creative disorder and emulate the ambiance of a startup, aiming to enhance innovation and foster the generation of information.

The socialization phase of the Nonaka model is a pivotal stage in the process of knowledge creation, wherein tacit information is exchanged and generated through direct interactions and firsthand experiences (Nonaka & Takeuchi, 1995). Knowledge sharing produces information distribution that is influenced by self-efficacy and individual beliefs (Nonaka & Takeuchi, 1995). Perceive talent motivates individuals to share knowledge and disclose information related to entrepreneurial activities (Nonaka & Takeuchi, 1995).

The fear of failure rate affects willingness to take risks and share tacit information (Cacciotti et al., 2016). In a study, Farnese et al. (2019) used a broad survey to explore how to create new knowledge. He studied the eight-dimensional structure of the SECI model by using exploratory and confirmatory factorial analyses. In this study group of 372 workers participated from a variety of industries. Further, Cacciotti et al. (2016) investigated the relationship between fear of failing and sharing information. The finding of this study revealed that it effects significant willingness to take risks and the information-sharing process.

Externalization refers to converting implicit knowledge into new information in the form of creative ideas (Nonaka & Takeuchi, 1995). Entrepreneurial intentions determine a critical signal that shows the willingness to materialize knowledge-creation ideas (Krueger, 2000). Moreover, a career in the entrepreneurial profession highlights the way through which individuals want to envision personal goals (Shapiro & Sokol, 1982). Success stories also motivate people to become entrepreneurs, which shows in the form of a high reputation of successful entrepreneurs.

Growth expectations directly scale up business in the future (Wiklund et al., 2003). This is required at the early stage of the entrepreneurial activities that further develop the business in the long run. At this stage, understanding the private investors is essential in order to combine the new knowledge of business and bring it to the next level. Therefore, private investors are necessary to foster business activities (Acs & Amorós, 2008). For these measurements to work, specific data must be collected to understand and measure many aspects of entrepreneurship, such as how often new businesses, established businesses, and new businesses are started. In addition, "Entrepreneurial Employee Activity" is helpful during the combination phase because it combines



business knowledge with entrepreneurial goals. To encourage and support entrepreneurial activities within a company, the use of explicit knowledge is known as "concept" (Gupta et al., 2004).

According to the SECI model by Nonaka and Takeuchi (1995), internalization is the stage at which explicit information is taken in and turned into tacit understanding. New information always invites innovation that demands a strategic orientation of utilizing this new knowledge competitively (Damanpour, 1991).

Innovation-driven opportunities and necessity-driven entrepreneurship are outcomes of the internalization process. Block and Wagner (2010) explained intrinsic motivation is the psychological state behind innovation activities. Therefore knowledge creation process includes both psychological and contextual factors. These factors foster explicit knowledge that drives the internal motivations of entrepreneurs necessary for startup activities.

One of the perspectives of the knowledge creation process focuses on the knowledge creation process in global markets and using the same knowledge for exploiting new business opportunities (Zahra et al., 2005). Therefore, the focus of entrepreneurs should be on something other than local market conditions but as well global market dynamics that help them scale up their business ideas across international markets.

The concept of entrepreneurship has been subject to various interpretations and has been utilized to refer to a broad spectrum of endeavors. The term "entrepreneur" was initially coined by Schumpeter to refer to individuals who generate innovative ideas and transform them into successful, rapidly expanding enterprises (Schumpeter, 1947). Another example provided by P. Drucker clarifies that entrepreneurship is primarily characterized by its concentration on innovation, high levels of uncertainty, and the potential for both high risks and large rewards. These aspects are central to prevailing theories of entrepreneurship (Drucker, 2014). Entrepreneurs utilize their knowledge to enter the market and compete with existing companies, which are typically more extensive and more capable. Their main task is to identify and take advantage of opportunities. To ensure their survival, fledgling enterprises must prioritize the development of their knowledge management (KM) system while they navigate the challenging period of financial instability and work towards achieving profitability. However, knowledge management (KM) systems are typically not the primary focus of startups, as the lack of emphasis on KM can only partially be attributed to a lack of scale. Small and medium-sized enterprises (SMEs) frequently employ innovative and efficient methods to overcome limitations in resources.

Successful entrepreneurs typically engage in the following activities, as they need to generate knowledge at a faster pace than their larger competitors. Cultivate an environment that facilitates the accelerated generation of knowledge. Typically, the core team consists of individuals with diverse backgrounds who all have a shared vision for the success of the new startups. They can collaborate, concentrate, and deliberate on several aspects pertaining to the firm. 2) They are currently in a state of artistic disarray. Typically, startups operate inside a specialized market segment, facing more substantial competition. Primarily, they need more resources, personnel, and financial backing, leaving them with no choice but to focus on just survival and expansion. In an environment characterized by creative chaos, individuals are inherently motivated to generate knowledge at an accelerated pace. 3) Minimize political influences and interpersonal dynamics that impede the process of debate. There are no potential negative consequences for one's professional trajectory, nor any restrictions on one's decision-making power. Conversely, the team will be granted greater decision-making authority and actively contribute to the new business endeavor.

Entrepreneurial ventures inherently prioritize innovations, whether it be in their products or services, their business operations or locations, or a mix of these factors. The survival of an entrepreneurial organization is predicated on creating a competitive advantage through fulfilling an unmet market demand, irrespective of the varying degrees of innovation they employ (Vrande, 2009).

### **Association Between SECI Framework and Entrepreneurship**

The SECI model states that knowledge is generated through a process of creative disorder, where tacit and explicit knowledge interact, resulting in a continuous flow of activities that enable the creation, transfer, and application of knowledge. Socialization is a critical part of the entire process, and entrepreneurs typically excel in this feature compared to traditional corporate employees. According to Desouza and Awazu (2006), socializing is the primary means by which knowledge is transferred from owners to employees and among employees. They argue that both formal and informal socialization methods, which occur spontaneously throughout the day, play a crucial role in facilitating the interchange of knowledge. Another essential aspect is that personnel in new companies typically acquire new abilities and assimilate them through a rapid internalization process. Given the precarious state of new businesses, characterized by limited time and resources, they must be highly responsive.

Consequently, any new information generated within the company will be promptly assimilated through decisive measures. Numerous deviations and mistakes can occur during this process. Still, once the spiral has been initiated, the entire SECI process operates at a faster pace compared to large and established organizations.

In today's business world, knowledge is increasingly becoming crucial, significantly, as financial resources and assets are growing limited. Major corporations have recognized that customer behaviors are evolving, and they need help in generating new knowledge within their businesses to respond to these changes effectively. Entrepreneurs are establishing disruptive companies that have the potential to expedite the generation of new information, enhance the efficiency of knowledge management, and have a substantial influence on established businesses. Early-stage startups are increasingly recognizing the significance of knowledge management systems as they adopt the strategies employed by new firms to promote internal entrepreneurship and instigate change.

### **SECI Model of Entrepreneurial Development**

According to Hang et al. (2018), entrepreneurial development can be captured by looking at the indicators of the SECI model. In this regard, the conceptualization and operationalization of these related components will provide valuable insights into the entrepreneurial development process (Hang et al., 2018).

### **Research Gap**

Recent studies have shown a research gap where the empirical connection is missing between the SECI model and early-stage entrepreneurial activities (Egu et al., 2022). Davidsson and Gordon, 2016; Georgescu, et al., 2019).The early-stage initiatives assess nascent and earlier stages of entrepreneurial activities that offer a holistic perspective on entrepreneurial initiatives (Davidsson & Gordon, 2016). Therefore, this field still needs to include a substantial knowledge gap on how the knowledge creation process affects the entrepreneurial context (Davidsson & Gordon, 2016).

Therefore the following SECI model parameters are required to investigate. This includes socialization, externalization, combination, and internalization and how they affect the early stages of entrepreneurial activities in a particular region (Hang et al., 2018). This is challenging for researchers to identify the entrepreneurial knowledge creation process due to the underlying complexity of regional geographical and socioeconomic conditions (Spender, 1996). So, this is an effort to investigate the relationship between entrepreneurial activities and the knowledge management process (Chua et al., 2013).

### Implications for Practice and Policy

The outcome of this research provides new insights for policymakers and practitioners to develop a framework that focuses on the knowledge-creation process for entrepreneurial activities (Davidsson & Gordon, 2016). To achieve this goal, they need to work on the entire ecosystem rather than concentrate on individual contextual factors that help to foster regional knowledge creation (Hang et al., 2018). Thus, this study links both theory and practice in such a way as to provide evidence on scientific grounds (Spender, 1996).

**Table 1: Data sources and conceptualization of SECI framework**

SECI Dimension	Relevant Variables	Reason for Classification
Socialization	Perceived Capabilities Fear of Failure Rate Know Startup Entrepreneur Rate	These variables reflect how the socialization of tacit knowledge translates into the form of shared experiences.
Externalization	Entrepreneurial Intention Entrepreneurship as a Desirable Career Choice High-Status Successful Entrepreneurship	These variables reflect how externalization of tacit knowledge into explicit knowledge through articulation and documentation.
Combination	Perceived Opportunities Informal Investors Rate Established Business Ownership Rate	These variables explain the combination of explicit knowledge through the systematic organization and categorization of knowledge.
Internalization	Innovation Necessity-Driven Entrepreneurial Activity Improvement-Driven Opportunity Entrepreneurial Activity New product early stage Entrepreneurial activity	The mentioned variables explain the internalization of explicit knowledge into tacit knowledge by the process of learning by doing and reflection.
Total Early-Stage Entrepreneurial Activity (DV)	The term "Total Early-Stage Entrepreneurial Activity" (TEA) refers to a variable that explains to extent of entrepreneurial activities that are yet at their early level of early-stage entrepreneurship. The proprietors of new businesses: Individuals who are either in the process of launching a new business or are actively making preparations to do so are included in this group. Even though they have yet to establish their company fully, they have already taken a number of concrete steps in the direction of getting their firm off the ground. Owners of new businesses are persons who have just begun and are now running a business that has been in operation for less than 42 months.	

### Socialization

Nonaka and Takeuchi (1995) explain that the socialization phase is different because people share and create tacit knowledge through direct interactions and meetings. At this stage, perceived



capabilities are an essential component because self-efficacy demonstrates the belief to share knowledge (Bandura, 1997). The 'Fear of Failure Rate' (Cacciotti et al., 2016) shows how willing people are to share unwritten information and take risks.

### **Externalization**

Externalization is the process of turning hidden knowledge into clear ideas (Nonaka & Takeuchi, 1995). "Entrepreneurial Intention" is a significant variable in this case because it shows how personal goals are turned into real goals (Krueger, 2000). Thinking about "Entrepreneurship as a Desirable Career Choice" is similar because it involves projecting personal beliefs and values onto a planned career path (Shapiro & Sokol, 1982). According to Acs et al. (2014), the terms "High Status Successful Entrepreneurship" and "High Job Creation Expectation" make it clear what the goals and aspirations of entrepreneurs are. "Growth Expectation Early-Stage Entrepreneurial Activity," on the other hand, means that the business owner is planning to grow (Wiklund et al., 2003).

### **Combination**

Explicit knowledge is gathered, structured, and integrated during the Combination phase (Nonaka & Takeuchi, 1995). The term 'perceived opportunities' in this context refers to integrating diverse information to identify potential for new ventures or innovations (Shane, 2003). Acs and Amorós (2008) define the 'Informal Investors Rate' as an indicator of a combinatory comprehension of the investment environment.

Data sets are required that capture early-stage entrepreneurship, business setup rates and nascent entrepreneurial rate, and new business ownership percentage (Reynolds et al., 2005). This stage also includes activities related to entrepreneurship, which involves the integration of entrepreneurial initiatives with the global knowledge process in organizations (Gupta et al., 2004).

### **Internalization**

Internalization manifests the knowledge creation process, which is where explicit knowledge transfers into tacit knowledge (Nonaka & Takeuchi, 1995). This refers to the innovation where explicit information is internalized and condensed in innovative products and services (Damanpour, 1991). Self-employment brings this process to the next level and motivates individuals to internalize entrepreneurial activities (Block & Wagner, 2010). At the same time, internalization offers new, unique strategies to come up with competitive products and services (Zahra et al., 2005).

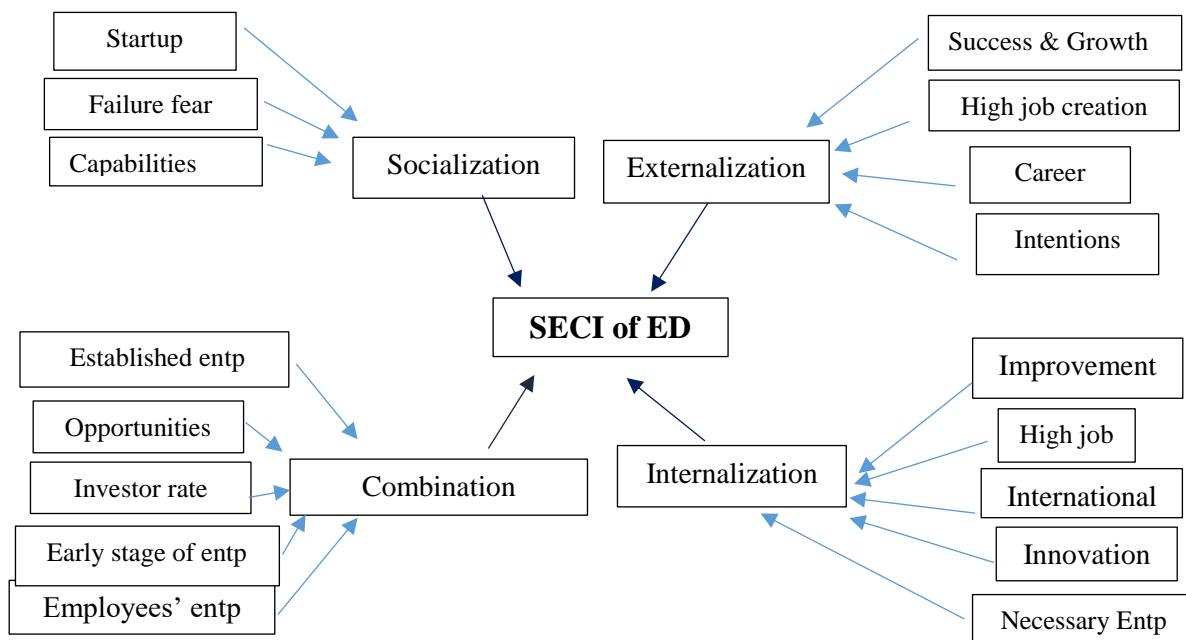
The analyses above demonstrate the complex interconnections that exist among different entrepreneurial variables and the SECI model phases. The fact that each phase contributes in its way to the knowledge creation and administration process demonstrates the complexity of entrepreneurship.

When considering the socialization, externalization, combination, and internalization components of the SECI model and the provided variables, it is essential to designate a dependent variable that these factors may affect. A suitable dependent variable could be constructed within the framework of entrepreneurship and organizational behavior. Extensive representation: TEA comprises a multitude of facets pertaining to entrepreneurship, encompassing the initial phases of business development, new business ownership, and nascent entrepreneurship. This all-encompassing metric effectively encapsulates the fundamental dynamics of entrepreneurship within an economy.

### Research Framework

The SECI model of entrepreneurial development formulates the indexes. Socialization starts with dialogs among potential entrepreneurs discussing entrepreneurial capabilities and tactics related to avoiding fear of failure behavior, which is the early stage of transferring tacit knowledge in coded form. Capabilities realization is essential as this pushes individual efforts to condense the ideas into material form. Therefore, the next externalization stage requires building strong intentions of taking the initiative and career growth, which is considered an essential element of this phase. So, finally, opportunities are combined that lead to innovation in the form of internalization. The SECI framework provides the necessary context for knowledge-creation activities in the form of successful startups. Second, entrepreneurship research should focus on socio-economic development is required for human capital development. The Agenda of this research focuses on the knowledge creation process in the form of entrepreneurial activities by using the SECI model. Secondly, the operationalization of the SECI framework within the context of entrepreneurial development will be focused on. Lastly, the agenda focuses on containing global data of all countries in order to demonstrate the empirical evidence of knowledge creation theoretical perspective.

**Figure 1: The purposed framework of study**



### Variables and Data Sources

A description of the factors that are defined in order to measure the SECI entrepreneurial development process can be found in table 1. All of the metrics have been compiled from reputable sources, i.e., Global Entrepreneurial Monitor (GEM).

This study employs a global population encompassing all countries. The data was gathered within the 2008 to 2020 time frame. The GEM dataset incorporates the pertinent information from this study, which provides multiple indicators of entrepreneurship (Bosma et al., 2008). When SECI indices, it is essential to consider all diverse factors of socialization, externalization, combination,

and internalization. This helps in the development of a comprehensive framework of entrepreneurial activities within a region.

The concept of the SECI framework is based on the knowledge creation process in line with the entrepreneurial development process. The knowledge creation process ensures the proactive participation of countries in entrepreneurial activities. It guarantees to convert tacit knowledge through collaboration and translating capabilities. The context is a significant factor that encompasses both micro and macro indicators (Seguí-Mas et al., 2019). Countries can evaluate the degree of knowledge creation in their context.

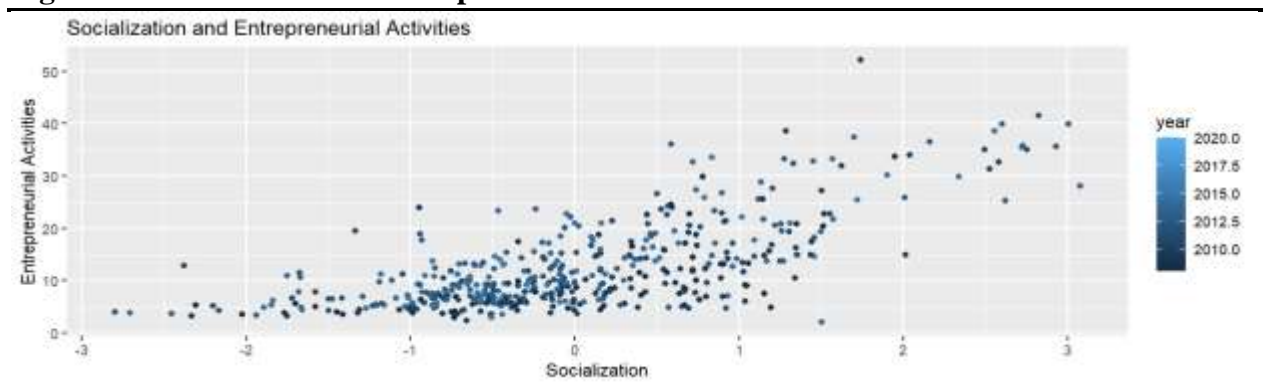
**Table 2: Total Variance Explained**

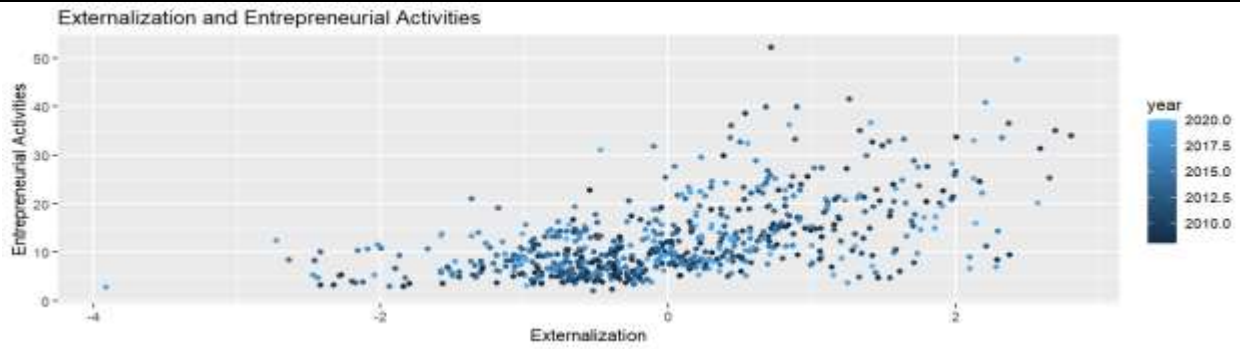
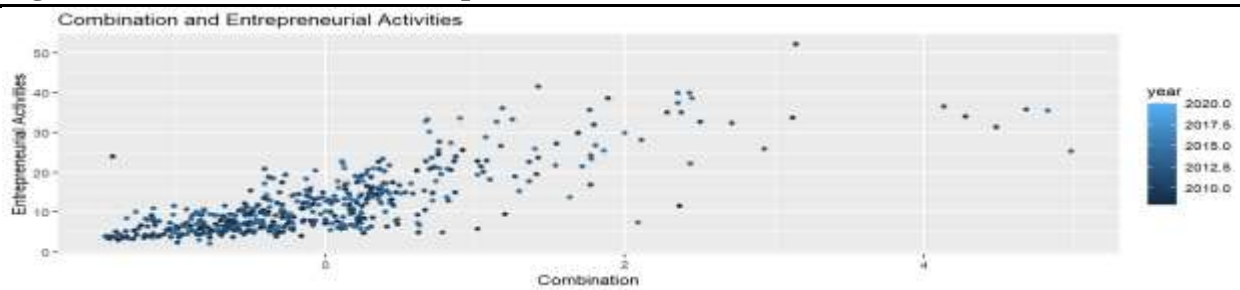
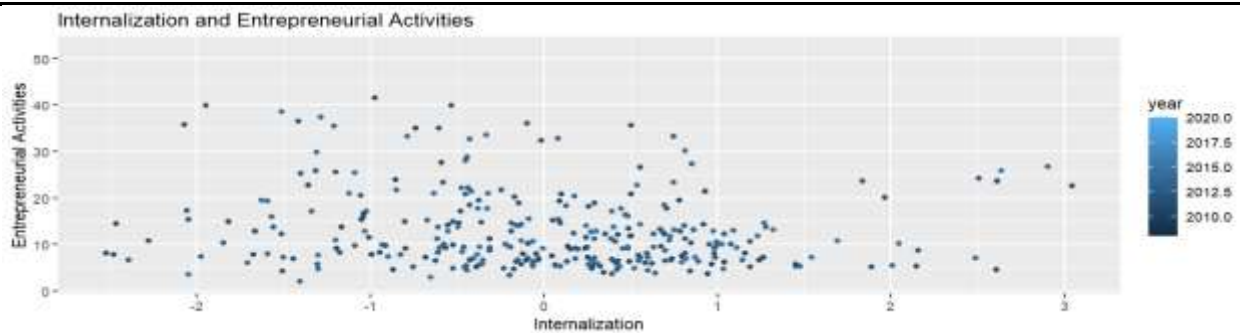
	Socialization		Externalization		Combination		Internalization	
Obs	467		430		237		313	
Bartlett (prob)	352 df(3), p.value < .001		Chi-square: 386.25 df(3), p.value < .001		Chi-square: 107.73 df(10), p.value < .001		Chi-square: 223.36 df(6), p.value < .001	
KMO	0.56		0.63		0.56		0.51	
	Eigen Value	Variance %	Eigen Value	Variance %	Eigen Value	Variance %	Eigen Value	Variance %
1	1.93	64.37	1.87	62.36	1.67	33.41	1.73	43.32
2	0.74	24.73	0.69	23.01	1.29	25.73	1.29	32.28
3	0.33	10.90	0.44	14.63	0.82	16.46	0.63	15.80
4					0.74	14.70	0.34	8.60
5					0.48	9.70		

### Graphs

The figure 2 shows that the socialization and entrepreneurial activities are showing association. Similar with the case of figure 3, figure 4, and figure 5.

**Figure 2: Socialization and entrepreneurial activities**



**Figure 3: Externalization and Entrepreneurial activities****Figure: 4 Combination and Entrepreneurial activities****Figure 5: Internalization and Entrepreneurial activities****Table 3: Correlation of Index components**

	Socialization	Internalization	Combination	Internalization
1	-0.74	0.79	0.69	0.49
2	0.76	0.85	0.85	0.86
3	0.90	0.73	0.81	-0.59
4				0.78

**Table 4: FGLS regression results**

Socialization Variables	Coef. (Prob.)	Externalization Variables	Coef. (Prob.)	Combination Variables	Coef. (Prob.)	Internalization Variables	Coef. (Prob.)
Soc1	2.72 (0.00)	Ext1	1.268 (0.00)	Comb1	3.87 (0.00)	Inter1	0.0517 (0.00)
R Squared	0.6768						
Total Sum of Squares	16590						
Residual Sum of Squares	5361.6						

### Interpretations of the Results

The estimated coefficients, standard errors, z-values, and p-values for the model are included in the output. Furthermore, it furnishes the residual sum of squares, the multiple R-squared value, which assesses the extent to which the independent variables account for the variability observed in the dependent variable and the total sum of squares. For the estimation of linear panel models using general feasible generalized least squares, with or without fixed effects, the FGLS function is utilized. This method is especially beneficial when dealing with panel data, whether they are balanced or asymmetrical, and provides the ability to define distinct error covariance structures within each observation group. The model exhibits substantial statistical significance, as evidenced by the z-values and corresponding p-values in the output. Multiple R-squared = 0.67681 indicates that the model adequately explains a considerable amount of the dependent variable's variance. The data you furnished presents the outcomes of a chi-square test employing three degrees of freedom, a test statistic of 352, and a p-value below 0.001.

When assessing statistical hypotheses, the chi-square test is frequently applied to determine whether two categorical variables are significantly correlated or interdependent. The examination assesses whether the frequencies recorded in a contingency table correspond to the frequencies predicted under the condition that the variables are independent.

With a chi-square test statistic of 352 and three degrees of freedom, this instance indicates that the variables under consideration are strongly correlated or dependent. A p-value below 0.001 signifies, with a high degree of confidence, that the observed association is statistically significant. In summary, the study's findings indicate a noteworthy correlation between the variables under investigation, rendering the association improbable to have materialized spontaneously.

### Discussion

The findings of this study reveal the underlying process of unlocking hidden potentials and maximizing the capabilities of individuals, academic institutions, and public and private organizations to generate and create new knowledge and insights related to entrepreneurship development. The empirical findings explain how an entrepreneurial environment encourages creativity, innovation, and the development of entrepreneurial skills. Within a regional, political, and social context, the SECI model demonstrates the importance of cultivating an entrepreneurial perspective by using a holistic approach to entrepreneurial activities. Furthermore, it illustrates that institutional support is essential for the development of the potential for knowledge creation, which in turn fuels entrepreneurial intentions and behaviors and contributes to sustainable socio-economic development (Bilal et al., 2024).



## Conclusion

Utilizing the Global Entrepreneurship Monitor (GEM) dataset, this study examines the impact of the SECI entrepreneurial development model on entrepreneurial activities by linking this relationship with sustainability in a region. In order to estimate the coefficients of a multiple linear regression model that connects the four dimensions of the SECI model (socialization, externalization, combination, and internalization) to indicators of entrepreneurial activity (total early-stage entrepreneurial activity, established business ownership rate, and entrepreneurial employee activity), the paper employs the feasible generalized least squares (FGLS) technique. The results suggest that entrepreneurial activity is substantially and positively influenced by each of the four components mentioned above of the SECI model. Additionally, the extent of these effects is contingent upon the economic development level and institutional quality of the respective regions. This research contributes to the current body of knowledge regarding entrepreneurship and knowledge management by providing empirical evidence that substantiates the practicality and validity of the SECI framework. This research offers practical implications for entrepreneurs, educators, and policymakers who are striving to foster a culture of entrepreneurship and innovation.

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