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Measuring Innovation Capability on Organizational Level: Challenges and Solutions

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Abstract – To remain competitive in ever-changing markets, organizations must evaluate their capacity for innovation. It does, however, come with a few difficulties. This study examines these issues and suggests workable fixes. The lack of a generally recognized definition and framework for innovation capabilities, the use of arbitrary evaluation techniques, and the dynamic nature of innovation are important problems. The paper suggests adopting broad frameworks that capture different aspects of innovation capability, creating objective measurement tools to capture both tangible and intangible aspects, putting longitudinal studies into practice to monitor changes over time, and coordinating innovation metrics with organizational strategies in order to address these challenges. Organizations may improve their competitive edge in today's quickly changing business environment and obtain important insights into their innovation readiness by methodically tackling these obstacles.

Keywords – Innovation; Organizational level; Measuring; Innovation Capability, Performance Measurement

I. INTRODUCTION

The business environment nowadays is increasingly hectic and aggressive. Surviving and what is more, succeeding in such surroundings can be achieved only through swiftly adapting to day-to-day changes. The factor that enables such flexibility is the capability for innovation. It is important to understand that innovation is a term that refers not only to products and services but also to marketing and organization as a whole.

In the literature, innovation capability can be found in a substantial number of studies; however, the scale of measurement of the innovation capability and suggested measurement models have been scarce, since the measurement of innovation is quite likely to be challenging because of its broad and intangible nature.

There is a considerable gap in the literature as normally studies are grounded on a single or a very small number of indicators to completely comprehend the nature of the innovation capability. However, innovation necessitates the blend of more than one of these indicators to be effective (Guan & Ma, 2003).

In this literature review, we will analyze the basic concept of innovation and innovation capability. We will try to understand the difference between the terms such as innovation capability and dynamic capability, which are quite often used interchangeably. Next, we will discuss the correlation between innovation capabilities and technology along with technological advancements. After that, we will scrutinize the necessity of measuring innovation as well as the available measurement frameworks. It is vitally important to understand the difference between innovative activities in smaller-scale companies and large corporations. For this purpose, we will separately focus on innovation activities and their

measurement in SMEs and huge corporations, discussing both similarities and disparities. Along with the discussion of SMEs and large-scale companies, we will analyze the challenges that are faced by these companies as well as the solutions.

In short, the research question of this study is what are the key challenges associated with measuring innovation capability on the organizational level, and what practical solutions have been proposed to address these challenges in the literature?

II. Materials and Method

The selection of literature for this evaluation was done on the basis of how well it addressed the issue of measuring innovation capabilities in organizations. Peer-reviewed journals and reliable academic databases were the sources of articles, books, and reports that were taken into consideration. To guarantee relevance and thoroughness, a significant focus was given to the recent publications.

To find pertinent literature, a methodical search technique was used. Various combinations of the terms and phrases "innovation capability," "measurement," "organizational innovation," "innovation performance," and "innovation assessment" were employed. Academic databases like PubMed, Scopus, Web of Science, and Google Scholar were searched. Manual searches of the reference lists of pertinent papers yielded additional sources.

Articles that addressed how to quantify innovation capabilities in businesses, presented theoretical or empirical support, and offered insights into pertinent concepts and frameworks were all considered for inclusion. Research that only looked at particular sectors or areas were included if they provided more comprehensive understandings that could be used to organizational innovation. Articles written in languages other than English were not included because of translation constraints.

To extract data, important themes, concepts, measurement frameworks, and empirical findings about the assessment of innovation capability had to be identified. Selected articles were analyzed to extract pertinent material that was then combined to create a thorough overview of the subject. To find patterns, trends, and gaps in the literature, the retrieved data were evaluated qualitatively.

The conclusions drawn from the chosen literature were combined to offer insights into the problems and potential solutions related to assessing an organization's capacity for innovation. To support a logical narrative, important ideas, measurement strategies, and empirical data were compiled and arranged thematically. The goal of the synthesis was to present a fair analysis of the subject while emphasizing potential directions for future study.

III. Results

A. Confusion between Innovation Capability and Dynamic Capability

Even though the terms “innovation capability” and “dynamic capability” are quite often used interchangeably, they have different connotations and implications concerning business strategy. Innovation capability refers specifically to an organization’s ability to generate and implement novel ideas and operation systems (Teece, Pisano, & Shuen, 1997).

Dynamic capability originally was defined as the ability of a company to integrate, design, and restructure internal and external proficiencies to tackle a hastily changing environment. Compared to innovation capability, it is a more profound concept that embraces an organization’s capability to adjust to changes, making the most of new opportunities and reacting appropriately to potential or existing threats (Helfat, Eisenhardt, & Martin, 2010).

B. The Role of Technological Advancements in Innovation Capability

Technological developments are incorporated into driving innovation capability, creating the foundation of revolutionary processes across various industries (Smith, 2019; Jones et al., 2020). The meeting point of technology and innovation not only launches organizational growth but also indicates the versatility and competitiveness of businesses in today's fast-paced environment.

- *Technological Catalyst for Creativity:*

Technology acts as a powerful facilitator, supplying the tools and platforms essential for nurturing creativity within corporate environments (Brown & Miller, 2018). Cutting-edge software, AI, and shared platforms enable ideation and simplification of the innovation process.

- *Acceleration of Research and Development:*

The incorporation of advanced technology speeds up research and development cycles, supporting organizations to anticipate market trends and supply innovative products and services (Porter & Stern, 2017).

- *Efficiency Gains through Automation:*

Technology-driven automation improves operational effectiveness and frees up resources for innovation-related projects.

- *Access to Global Knowledge Networks:*

Through linked international networks, technology facilitates the free movement of ideas and knowledge across borders.

- *Adaptability to Market Dynamics:*

An organization's ability to innovate depends on its ability to adjust to changing market conditions. Technology gives companies access to the most recent data analytics and industry insights, facilitating knowledge-driven decision-making and proactive reactions to situations that are always changing.

C. Measuring Innovation Capability

To effectively measure the innovation capability a performance measurement framework can be applied, and as far as an organization is concerned, innovation capability measurement should be connected to the overall assessment of the organization’s performance.

The measures are split into direct and indirect, objective, and subjective, and financial and non-financial ones (Minna & Ukko, 2012). Objective measures are derived from quantitative data. Subjective measures are normally based on individuals’ opinions ((Lönnqvist et al., 2006). Measuring the performance is conventionally focused on financial measures (Yliherva, 2004; Bourne et al., 2005). Nowadays performance measurement is regarded as a thorough process, which implies that each event taking place in the organization is considered to be impactful on the performance of the organization.

There is not a widely accepted agreement on what the main components and characteristics of performance measurement should be (Dumond, 1994). The most widely recognized and implemented performance measurement systems are, indisputably, the Balanced Scorecard (Kaplan, Norton, 1996) and the EFQM Business Model (EFQM, 1999). The Balanced Scorecard was founded on the envision and long-term planning of the organization and has five perspectives, which are finances, customer orientation, process, renewal, and development, as well as human resources, so it can be stated that the BSC can be implemented at all levels of the company. This framework enforces the organization to spotlight the most vital measures, with the aim of circumventing information overload (Kaplan, Norton, 2005). To simplify, the Balanced Scorecard carries out three elementary roles in an organization: the system of measurement, strategic management system as well as being a tool for effective communication. The chief idea behind this measurement system is to elaborate and implement the organization’s view and, next its strategy into set goals and smart compilation of both financial and non-financial indicators of performance.

The EFQM Model is a descriptive system, which was proposed to facilitate organizations to measure improvement towards excellence and constant development. This model is based on the following basic ideas of excellence:

- Being result-oriented.
- Involving and, subsequently, developing people.
- Being customer-focused.
- Non-stop learning, innovation, and development.
- Strong leadership
- Development of efficient partnerships.
- Managerial decision-making through a transparent process and facts.
- Being held accountable (Calvo-Mora et al., 2005).

The structured methodologies that both BSC and EFQM offer for identifying possible dangers and areas for development are what bring them together. Furthermore, an organization's strategies are translated into specific, well-defined objectives and attainable goals via both of these systems.

Distinctively different from these systems, competition-based methodologies were introduced, such as Performance Prism, the Navigator, The Intangible Asset Monitor, and SMART Performance Pyramid.

Unraveling the complexities, the Performance Prism consists of 5 factors: satisfaction of stakeholders, strategies, capacities, processes, and the contribution from stakeholders. This framework facilitates leaders to focus on major issues they want to handle when operating the organization (Neely et al. 2001a).

The Navigator comprises financial measures along with non-financial ones, which calculate the market value of the organization (Bontis, 2001; Lönnqvist et al., 2006).

The Intangible Asset Monitor consists of three types of intangible assets: external class (relations with the stakeholders etc.), internal class (management, etc.), and competence of the individual beings (expertise, experience, etc.). Each of these classes is estimated through three indicators: increase and renewal, efficiency, and consistency (Bontis, 2001).

Moving on to another performance measurement system, the SMART Performance Pyramid was suggested by Cross and Lynch (1992). The chief objective of this performance pyramid is to align the strategy of the organization and its day-to-day operations by disaggregating the organization's complex objectives into manageable granules, that can be overseen at every level of the organization ("top-down") and it is measured bottom up.

Despite having so many performance measurement methods, scholars have not come to a consensus yet on what system can be accepted as a universal optimal practice owing to the following requirements for performance measurement (Gomes et al., 2004):

- PM should mirror applicable non-monetary data based on chief success factors of every type of business (Clarke, 1995).
- PM should be applied as a way to translate strategy and oversee the business outcome (Grady, 1991).
- PM should be rooted in the objectives of the organization, critical success factors, and needs of the customers and other stakeholders.

IV. Discussion

A. Innovation Capabilities in Small and Medium-Sized Enterprises (SMEs) and the Challenges They Face

SMEs play a vital role in economic growth owing to their extensive number and omnipresence in diverse markets (Bruque & Moyano, 2007). Moreover, they contribute tremendously to innovation operations. However, this segment faces numerous challenges in terms of innovation, especially since the market globalization, economic volatility, swift life cycles of products and increasingly developing technology impact the competition environment (Utterback, 1994).

• *Limitations in terms of the availability of resources:*

SMEs normally operate with constrained resources, should they be financially, human resources-wise, or technologically in comparison to large-scale companies. This may make it more challenging to define and estimate innovation more consistently and purposefully (Freel, 2000), however, it may also bring about creative methods that are more cost- and resource-efficient and utilize resourcefulness.

Unfortunately, normally SMEs are the companies that have been in the market for comparatively a shorter period, therefore, it tends to be challenging for them to gather enough expertise or merely collect a sufficient amount of data which is needed to estimate the innovations efficiently (Saunila & Ukko, 2012).

Another aspect that may take place in terms of SMEs' operational activity is they may use ineffective and outdated measurement tools, which are not designed or applied effectively. This will result in unreliable or erroneous outcomes, which can create an obstacle for SMEs to make a correct and considered decision in terms of their innovation strategy (Saunila & Ukko, 2012).

In addition, due to the lack of expertise, SMEs may interpret the outcomes of their performance measurement of innovation management incorrectly. For instance, they may pay more attention to financial measurements and simply overlook a wider impact of innovation in terms of the overall performance of the company. This may result in misguided decisions regarding the allocation of resources and innovation strategies.

• *Dynamics of the environment in the market:*

SMEs normally function in niche markets or with a particular client base. This creates a prerequisite to be more adaptable to the requirements and wants of their targeted clients as well as making them more flexible in terms of adapting their products and services to satisfy the demand, especially considering how fast-paced the current market is (Ireland, Kuratko, & Covin, 2009).

On the other hand, SMEs are normally under significant pressure to yield quick profits to meet their operational costs. Therefore, it may result in SMEs focusing on the measurement of monetary performance, such as profitability and revenue, which will occur at the expense of innovation performance. Thus, they will be unable to concentrate on the long-term advantages that are brought by innovation (Adams et al., 2006).

• *Objectives set for innovation:*

SMEs tend to innovate to survive and expand in a hugely competitive environment, trying to create a niche for themselves and to be distinguished from others, and as a result to increase their market share.

Conversely, larger corporations' desire to innovate stems from an idea to retain their leadership in the market or obtain a competitive advantage by bringing breakthrough innovations that distort the industry (Anderson & Tushman, 1990; Christensen, 1997).

• *Innovation-related processes:*

SMEs, not having the strict hierarchy of large corporations, may be involved in innovation processes more informally and organically since they rely on the creativity of their employees, collaborations, and continuous feedback which assists in producing and implementing new ideas.

The strict hierarchy in bigger corporations may be justified by the necessity to involve larger innovation teams and proper project management strategies due to the heterogeneity and scale of the companies (Chesbrough & Vanhaverbeke, 2003).

B. Innovation Capability in Large Companies and the Challenges They Face

As much as it has been argued, innovation capability is a crucial element for sustainable success for larger companies as for SMEs. But unlike small- and medium-sized companies, larger firms require and utilize innovation to seek source components, deal more efficiently with their administrative tasks, and organize distribution on a global scale (Tidd, Bessant, Pavitt, 2005). Thus, innovation capability does not represent solely a means of survival for them, instead, this is an effective way of expansion to the world.

Now we have to scrutinize the key factors, leading to a concentration of efforts toward the improvement of innovation capability by large companies.

• *Creation of a competitive edge:*

Innovations grant larger companies a distinct competitive edge in the market. The capacity to continually present new products, services as well as operations distinguish them from their rivals, attracting more customers and maintaining brand loyalty (Porter, M. E.,1990).

• *Aligning to market changes:*

Large organizations must possess adequate innovation capabilities to enable them to promptly adapt to changing consumer needs, emerging technology, and industry trends as the markets continue to evolve at a rapid pace.

• *Efficient Utilization of Resources:*

Innovation generally results in the development of more efficient and optimized processes in large corporations. Subsequently, this advances efficiency in the management of operations, and cost reduction and improves general productivity (Damanpour, F., 1991).

•*Attraction of Talents and Their Further Retention:*

Conventionally, companies regarded as breakthrough corporations are more likely to get top talents. People are more drawn to firms that maintain and nurture a healthy environment where creativity is welcome (Tidd, J., Bessant, J., & Pavitt, K., 2005).

• *Being a market leader:*

Large corporations, continuously developing their innovation capabilities normally obtain a position of market leader. Through being a pioneer and devising new solutions, they even manage to impact industrial trends and get prominence as influential figures, establishing dominance in their markets (Govindarajan, V., & Trimble, C., 2005).

• *Satisfaction of Customers:*

Innovation straightforwardly influences customer satisfaction through enhancing product capabilities that meet shifting client requirements and wants. Such positive experience ensures that customer loyalty will increase, contributing to repeated business deals and ensuring long-term profitability (von Hippel, E., 2005).

• *Mitigation of Risks:*

Chesbrough et al (2006) strongly supported the idea that a potent innovation capability makes it possible for large corporations to diversify their product and services portfolio. Such diversification not only protects the companies from relying on solely one type of production but also acts as a proactive strategy to mitigate risks in dynamic business environments.

• *Long-term Sustainability:*

The skill of innovation is a cornerstone of sustainability plans for large corporations. Innovation enables them to leave competitors behind, adjust to shifting markets, and maintain relevance amid the non-stop evolution of the industry they belong to (Teece, D. J, (2007)

It is imperative to recognize that large companies inherently deal with heightened challenges regarding innovation capabilities when compared with SMEs (Jones, 2010).

- *Complexity of the organization:*

Extensive size and complicated structures which are attributed to large corporations can be an obstacle on the way to improving agility and fostering innovation. This can be explained by the intricate bureaucratic nature of these corporations, which hinders the accomplishment of innovative ideas and the general flexibility that is needed for successful innovation management (Tidd, J., Bessant, J., & Pavitt, K., 2005).

- *Aversion of risks:*

Large companies typically have a risk-averse nature of business, and this can be a huge impediment to innovation-related activities. The rising possibilities of financial losses associated with taking the risk of investing in innovation highly discourage such corporations from turning to experimentation and adopting new initiatives (Christensen, C. M., & Raynor, M. E., 2003).

- *Communication barriers:*

Simply the size of such companies contributes to the deterioration of transparent and eloquent communication, obstructing smooth idea flow and a proper collaboration so needed for innovation (Allen, T. J., 1977).

- *Being change-resistant:*

Larger companies are renowned for their established corporate cultures, which typically resist extensive changes, thus presenting a substantive difficulty for the implementation of novel ideas and technologies (Kanter, R. M., 1984).

- *Optimal allocation of resources:*

Allocating resources efficiently is a significant challenge for large corporations that are looking forward to innovation activities. To prioritize and allocate resources that efficiently assist innovation, a strategic and well-defined approach should be applied. The inability to strike the right balance may impose negative results on the overall organizational goals (Teece, D. J., 2007).

C. Solutions

In today's world, we can underscore the following methods of tackling the challenges faced by organizations in terms of innovation capabilities and their effective measurement:

• *Providing thorough communication:*

Close relationships are more inclined to promote comprehensive interaction and assist in the simplification of exhaustive information exchange within and between companies (Kraatz, 1998). Through maintaining regular communication among the members of the company, the knowledge of one employee may be converted and shared according to the ideas and concepts perceived by another employee, enabling creativity.

• *Integrated Innovation Framework*

A unified framework involves assessing diversified types of innovation. It extends further than product innovation to include process, organizational, and marketing innovations. This ensures that creative initiatives are not limited to a particular area and are integrated across the whole organization (Dodgson, Gann, Salter, 2008).

• *Innovation Audits*

Implementing regular innovation audits and involving systematical assessment and evaluation of an organization's innovation processes, practices, and outcomes will bring higher results to corporations. This approach helps identify bottlenecks, inefficiencies, or areas where innovation is not aligned with business objectives. Periodic audits provide a continuous improvement cycle for innovation strategies (Tidd, Bessant, 2018).

• *Longitudinal Analysis*

Longitudinal analysis involves analyzing innovation capabilities over a long period. This approach makes it possible for organizations to identify trends, patterns, and uniformities in their innovation performance. It assists in understanding the long-term effect of innovation-related initiatives and adjusting strategies accordingly (Dosi, 1988).

• *Integration with Strategic Goals*

Conforming innovation indicators with strategic goals guarantees that innovation initiatives are not undertaken in a detached realm but are straightaway aiding the overall success of the organization. This alignment helps focus on innovation initiatives that synchronize with the company's broader objectives (Christensen, 1997).

• *Customer-Oriented Metrics*

Incorporating customer-driven indicators, such as customer satisfaction with innovative products, creates a direct connection between innovation efforts and the subjective value of final users. This methodology highlights the significance of fulfilling customers' requirements and outlooks through innovation.

• *Open Innovation Measurement*

Open innovation engages collaboration with external partners, and measuring its effectiveness is important. Metrics may include the success rate of partnerships, the impact of external knowledge on internal innovation, and the ability to harness external resources for innovation (Chesbrough, 2006)

• *Cross-Functional Teams:*

Establishing coordinated teams gathers individuals with diverse expertise, fostering creativity and advancing problem-solving. This collaborative approach ensures that different perspectives contribute to the innovation process, making it more detailed and effective (Katzenbach, Smith, 1993).

• *Quantitative and Qualitative Metrics:*

The combination of quantitative and qualitative metrics provides a harmonized evaluation of innovation capabilities. While quantitative measures offer tangible data such as financial impact, qualitative assessments capture the softer aspects, like organizational culture and overall engagement of employees in innovation (Yin, 2017).

V. CONCLUSION

The nature of innovation is multifaceted and, as a result, it is challenging to define, assess, and quantify its impact. Another thing that raises obstacles in terms of innovation assessment is that the concept of innovation itself is encompassed with ambiguity. Moreover, the other factors that contribute to the complexity are the diverse organizational contexts, industries, and innovation types. Ultimately, there is also a necessity to balance short-term and long-term innovation goals, which adds an extra challenge.

Technological developments appear to be the key catalysts in addressing these challenges. Innovations in fields such as data analytics, artificial intelligence, and machine learning enable organizations to operate effectively on wide-ranging datasets, identify patterns, and obtain meaningful insights. Furthermore, there are rising trends like open innovation and shared platforms that facilitate organizations in exploiting external expertise and taking advantage of a more comprehensive knowledge ecosystem.

A shared concept that has been accepted across the literature is the support for integrated models that cover various dimensions of innovation. For example, maturity models, balanced scorecards, and comprehensive frameworks, which combine both quantitative and qualitative indicators, provide a more all-encompassing awareness regarding innovation capability. It is important to acknowledge the interrelation of people, processes, and technology to develop a detailed measurement approach.

Future research opportunities are becoming more evident as organizations continue to deal with the challenges associated with the measurement of innovation capability. The following areas may be included for further investigation–examination of the influence of industry-specific factors on innovation metrics, extended studies monitoring the development of successful innovation initiatives, and studies on the impact of leadership in cultivating a culture that favors innovation measurement.

It can be concluded that the explored literature underscores the critical importance of measuring the innovation capability of an organization if it aims to flourish in today's dynamic business environment. Even though the challenges are persistent, innovative solutions along with technological advancements and inclusive measurement approaches may offer a proper course of action.

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