

# AN INTEGRATED APPROACH TO SUSTAINABLE COMPETITIVE ADVANTAGE

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## ABSTRACT

To sustain a competitive edge amidst the dynamic nature of the current market and evolving technological landscape, manufacturing enterprises must ensure that their organizational resources, capabilities, and innovation procedures are optimized. In the manufacturing sector, innovators are known to earn twice as much as their less innovative counterparts, demonstrating the criticality of innovation. On that basis, this study used the *RCO technique*, which is an integrated approach to sustainable competitive advantage that focuses on resources, capabilities, and open innovation of the organization to improve decisions that lead to a lasting competitive advantage in a developing country. In addition, this study applied an analytical hierarchy process (AHP) approach for data analysis in calibrating the actual application of sustainable competitive advantage (SCA) in a company, especially in developing economies. The study results indicate that possessing valuable organizational resources necessitates adding distinctive capabilities to generate innovations that effectively contribute to attaining organizational objectives, specifically SCA. Moreover, through the utilization of positive knowledge ingress and outflow, open innovation is considered the *industry eye* of a business organization, with the purpose of accelerating innovation within the organization and expanding the market for innovations' internal and external applications. In conclusion, an integrated model for sustainable competitive advantage, which is vital to the long-term growth and sustenance of businesses, was devised as a result of this study.

**Keywords:** Analytical Hierarchy Process, Resource-Based View, Dynamic Capability, Open Innovation, Sustainable Competitive Advantage, Manufacturing in Namibia

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Submission: 8<sup>th</sup> October 2021

Accepted: 5<sup>th</sup> January 2024

<https://doi.org/10.33736/ijbs.6907.2024>

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## **1. INTRODUCTION**

Undoubtedly, the ongoing process of globalization fosters perpetual competition, thereby presenting developing economies with increased challenges in their efforts to retain and gain a competitive edge. The reason for this is the challenges associated with globalization, such as the rapid and unexpected evolution of technology (Nautwima & Asa, 2021). Consequently, strategic management is changing to include new business models such as open innovation-oriented competitive advantage and core competencies for SCA. The value and necessity of innovation in every sector are known for attaining organizational success. Innovate or die has become the only option in today's competitive economies (Asa et al., 2021). Prioritizing innovation has become the means by which one can produce and maintain a competitive advantage and superior performance. Integrating open innovation into the interplay between the capabilities and resources of an organisation is a pivotal element in attaining a competitive advantage and generating wealth. Therefore, to maintain a competitive advantage, these variables are crucial (Yu et al., 2017). On the other hand, research shows that closed innovations in R&D are the most common type of innovation (Dahlander et al., 2021). In that frame of reference, this study closes the innovation gap by considering the open innovation approach.

Generally, a strategy is a way to reach the goals and aims of the organization's vision and mission statements. Therefore, a business should have an effective strategy to keep up with technological development and variable market demands. In this respect, strategic management has evolved to emphasize an organization's capabilities and assets as potential drivers of enhanced performance and a competitive edge (Dahlander et al., 2021). For most of the 20<sup>th</sup> century, innovation theory and practice prioritized corporate control over new ideas. Thus, innovation has gained considerable attention from researchers worldwide (Asa et al., 2013). It has long been considered that modern industrial corporations are mainly due to the necessity of funding and controlling such breakthroughs (Bessen, 2022). As an alternative, Chesbrough (2003) proposed an open innovation strategy in which enterprises should look beyond their walls when advancing and commercializing new ideas. Thus, managerial strategies for innovation must be enhanced to overcome obstacles such as confusing market signals, technological uncertainty, and early competitive structures. However, continuous innovation becomes a critical concern for businesses desiring to capture a substantial competitive advantage because there is no permanent competitive advantage (Asa et al., 2021). Nevertheless, self-reliance can be challenging in the innovation process. Hence, the essentiality of open innovation.

Research and development (R&D) managers can capitalise on a multitude of benefits associated with open innovation by integrating internal competencies and resources with external sources of knowledge and technology (Asa et al., 2021). As a result, a framework for R&D managers to use and increase their innovation outputs by actively using outside knowledge sources becomes necessary (Chesbrough, 2003). Integrating internal resources and capabilities with open innovation from within and outside the business is critical for establishing a competitive advantage by integrating feasible internal resources and talents (Chesbrough, 2003). This study uncovers the links between resources, capabilities, and open innovation. Undeniably, innovation without a strategy has been ineffective in the past. Hence, from the highest to the lowest echelons of the organization's ecosystem, the system must be deployed.

A multitude of socioeconomic factors profoundly influence the contemporary economy. These include the expeditious evolution of consumer tastes and preferences, the requirement for investors to see immediate results and performance, the shorter life cycle of products and services, and intense competition (Blaikie et al., 1997; Asa et al., 2022). As globalization accelerates, so does the intensity of competition. In developing countries such as Namibia, the essence of rivalry is changing. Innovation is the solution and should be incorporated into an organization's day-to-day operational activities to achieve a competitive advantage, as companies can no longer rely on long-term strategies. These fast-paced markets are volatile and competitive, requiring businesses to adapt and influence their business environments. Hence, the rationale for this study.

## **2. THEORETICAL FRAMEWORK**

### ***2.1 Resource-based view***

The resource-based view (RBV) of the firm asserts that certain types of resources owned and controlled by companies have the potential and promise to provide a competitive advantage, which, in turn, results in desirable organizational performance (Wernerfelt, 1984). Managers assume a pivotal position within the organisation by possessing and overseeing VRIN resources, which enables them to allocate resources strategically to support the enterprise's expansion and continuity (Asa et al., 2023). To remain competitive, senior executives devote considerable time to analyzing, selecting, purchasing, and organising resources. Present-day operations demand strategic agility to maintain its competitive advantage; a business must enhance or modify its resources and advantages over the market (Dierickx & Cool, 1989; Barney, 1991; Peteraf, 1993; Wernerfelt, 1995; Barney, 1995; Chaharbaghi & Lynch, 1999; Fahy, 2000). A firm's competitiveness depends on a unique set of hard-to-copy resources, skills, and capabilities (Wernerfelt, 1984; Barney, 1991; Grant, 1996). These resources must be rare, valuable, and durable to gain a competitive advantage and generate above-average returns (Barney, 1991). The resource-based approach holds that companies may produce and capture value based on their unique resource bundle, accounting for firm performance disparities (Bierly & Chakrabarti, 1996). Intangible resources, which are valuable and hard to replicate, are more critical to achieving and sustaining a competitive advantage than physical and financial resources (Oliver et al., 1997; Makadok, 2001). The resource-based viewpoint also emphasizes that a firm's sustained competitive advantage depends on its internal resources and skills (Dyer & Singh, 1998).

### ***2.2 Dynamic Capability***

Dynamic capability is defined by Teece et al. (1997) as the capacity to integrate, develop, and reconfigure internal and external competencies in response to environments that undergo rapid change. Dynamic capabilities arose because of a significant flaw in the organization's resource-based view (RBV). The RBV has been criticized for disregarding resource factors, such as how resources are developed and integrated within the organization in favour of existing resources (Murschetz et al., 2020). Dynamic capability bridges these gaps by adopting a process-based strategy and acting as a buffer between firm resources and a fluctuating business environment. Dynamic resources assist a company in adjusting its resource composition and preserving its competitive advantage (Shan, 2019), which would otherwise be rapidly eroded. While the RBV

emphasizes resource selection or choice, dynamic capabilities emphasize resource development and renewal in response to rapidly shifting environments.

### ***2.3 Open innovation***

Chesbrough et al. (2006) invented the term open innovation, indicating that companies can and should employ both internal and external ideas and internal and external channels to the market and advance their technology. In the same light, open innovation enables organizations to seek international and unique knowledge beyond their organizational boundaries to maximize their innovation capacity (Asa et al., 2022). Therefore, increasing internal innovation and expanding the markets for the external application of innovation are the two goals of open innovation (Chesbrough et al., 2006). However, internal ideas and paths can only be included if the organization knows what is happening beyond its walls. Companies must scan their environs and develop a keen eye for potential opportunities to locate external ideas and resources to assist with open innovation endeavours. This ensures that the organization maximizes the benefits of every opportunity in its vicinity. Furthermore, it is nearly impossible for a single company to have all the expertise and knowledge necessary to constantly innovate and maintain a competitive advantage, making partnerships and networks appealing (Chesbrough et al., 2006; Asa et al., 2023). Similarly, Harris (2001) claims that, besides providing complementary assets, networks promote knowledge development from other sources.

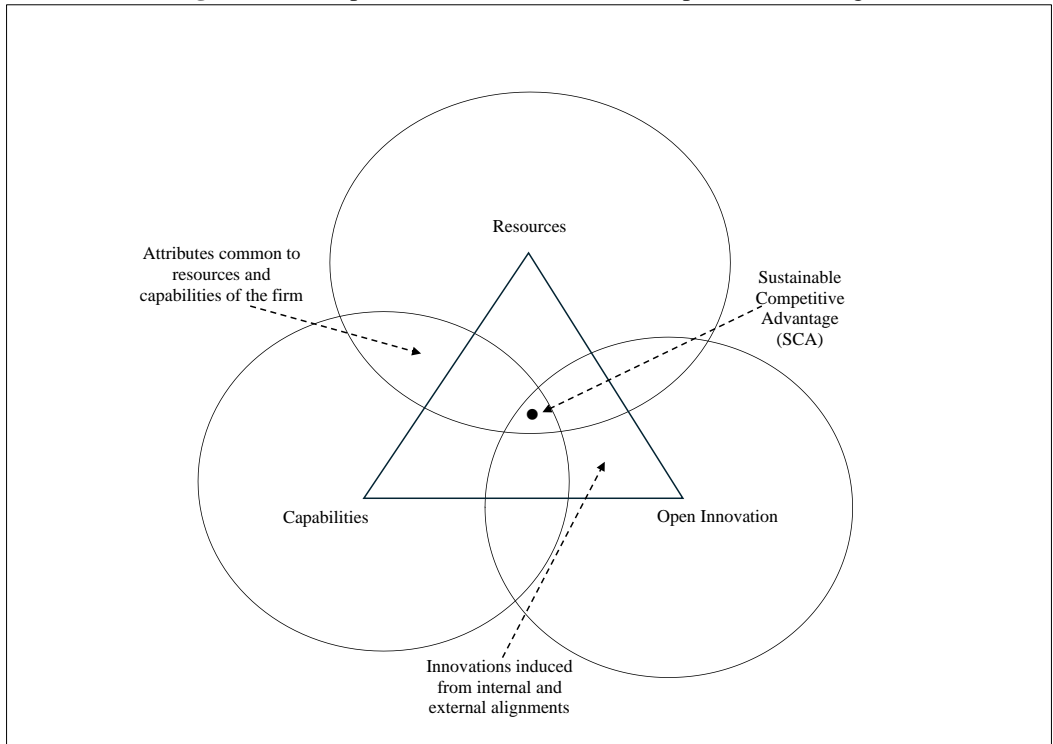
Analyzing the business environment is essential for discovering opportunities, acquiring new ideas, and finding the proper networking and partnership opportunities to create joint competitive advantages among organizations (Azeem et al., 2021; Asa et al., 2023). Since companies recognize the limitations of their internal resources and the wealth of knowledge available outside their walls, they engage in open innovation to embrace this wealth of outside knowledge and data. Hence, profit is about sticking with the present market and finding new methods to add value through licencing, spin-offs, and other entrepreneurial ventures (Azeem et al., 2021). The amount of R&D carried out using the external parts of the innovation value chain, the ratio between activities originating within the company and outside the company, the ratio of innovations or patents that have reached the market, and the channel to the market (existing market, spin-off, licencing) are all examples of open innovation activities (Yun et al., 2016).

## **3. RESEARCH MODEL DEVELOPMENT**

### ***3.1 Conceptual model of sustainable competitive advantage***

To achieve its primary purpose, namely sustained competitive advantage, the company must integrate organizational resources, capabilities, and open innovation, as shown in Figure 1. Whether big or small, every firm strives to maximize revenues and minimize risks, regardless of size (Agustia et al., 2020; Nautwima et al., 2023a; Nautwima et al., 2023b). Profits are only possible with the interplay and integration of various elements contributing to competitive advantage. Therefore, sustainable competitive advantage can be studied using this framework.

**Figure 1:** Conceptual model of sustainable competitive advantage



Source: Authors' compilation (2023)

### 3.2 Sustainable competitive advantage

This model's central node represents a long-term competitive advantage gained through various interrelated and interdependent processes. Customers see a company's competitive advantage as distinct over competitors (Ozbekler & Ozturkoglu, 2020; Nautwima & Asa, 2022; Asa et al., 2023). A long-term sustainable competitive advantage may be gained by having the capacity to maintain a competitive edge for a lengthy period while making it difficult for competitors to reproduce that advantage (Ahunjonov et al., 2013; Knudsen et al., 2021).

### 3.3 Resources

From a strategic management perspective, the organization is where resources are brought together, and they employ various methods to achieve their objectives. According to Wernerfelt (1984), four frequently used terms characterize the primary resources employed by organizations. They comprise human, financial, physical, and information resources, where managers oversee the securing and implementation of required organizational resources.

### **3.4 Capabilities**

The ability of a company to manage its diverse workforce effectively is the organization's dynamic capability (Ajgaonkar et al., 2022). The focus of capability is on internal procedures and systems for addressing customer needs and generating specific competencies that create a competitive advantage because they are distinctive. In addition, it guarantees that workers' abilities and efforts are oriented toward achieving the company's objectives and plans (Teece et al., 1997). However, even though organizational resources are required, organizational competence is essential to the corporate orbit. This is because organizational capabilities create value via the use of organizational resources, thus translating into dynamic capability (Teece, 2016). Thus, dynamic capability is the theoretical foundation that underpins and supports organizational capabilities as a variable contributing to sustainable competitive advantage.

### **3.5 Open innovation**

An essential component of open innovation is working closely with many possible partners to develop new technologies (Chesbrough, 2003). Almost by definition, open innovation is linked to the formation of linkages between innovating companies and other groups. Thus, many businesses must now work together with other companies to develop or absorb new technologies, market brand-new goods, or stay abreast of their fields' most recent technical breakthroughs. In addition, firms are increasingly creating customer value as part of more extensive networks where collaboration with other parties is another possible meaning of networking (Chesbrough, 2003). Therefore, collaborative efforts of specialist enterprises that each provide intermediary goods and services are the foundation of those networks. Information, communication, and technology allow these enterprises to be linked via sophisticated business-to-business (B2B) information systems as they become more robust (Wendt, 2021). An innovative company's partners can vary greatly depending on the goal they are trying to achieve. A company may, for instance, form alliances with universities and research labs, acquire technology-based start-ups, or establish networks with selected suppliers and customers to launch drastically new products or services based on new technologies (Javaid et al., 2022).

## **4. METHOD**

### **4.1 Survey procedure and sample**

In accordance with Saaty's (1980) AHP manual, the AHP survey was administered to 38 executives and managers tasked with decision-making responsibilities in manufacturing organizations of varying scales and categories of business activities in a developing country. This type of survey is called an affective survey (also known as an attitudinal survey) and was used to collect data based on the informants' perceptions, experiences, expertise and judgments. It only requires a small sample, in this case 38 informants. For the purpose of implementing SCA, the informants recruited for the study were seasoned professionals and specialists at the highest level who, via pairwise comparisons, understood the significance of resources, capabilities, and open innovation. An assessment of these judgments reflects the managers' decision-making toward implementing sustainable competitive advantage, given the availability or existence of such dimensional factors of resources, capability and open innovation within their respective companies.

**Table 1:** Gradation AHP scale for quantitative comparison of alternatives

| <b>Option</b>  | <b>Numerical value(s)</b> |
|--|---------------------------|
| Equal  | 1                         |
| Marginally strong  | 3                         |
| Strong   | 5                         |
| Very strong  | 7                         |
| Extremely strong   | 9                         |
| Intermediate values to reflect fuzzy inputs                                | 2, 4, 6, 8                |
| Reflecting the dominance of the second alternative compared with the first | Reciprocals               |

**Explanations:**

1= two activities contribute equally to the objective.

3= experience and judgement marginally favor one activity over another.

5= an activity is strongly favored over another.

7= an activity that is very strongly dominant over another.

9= the evidence favoring one activity over another is of the highest possible order of affirmation.

2, 4, 6, 8= used to compromise between two judgements.

*Source:* Saaty (1980)

**4.2 Development of the measurement**

Organizational resources are measured based on the AHP gradation scale from 1 (equally important) to 9 (extremely important). A total score of 14 items in the questionnaire was employed based on measuring organizational resources. The main elements include physical resources (4 items, namely the production technology, machinery or equipment, production capacity availability, and flexibility), financial resources (3 items, namely financial capital availability, accessibility, and liquidity), experiential resources (3 items, namely the manufacturing experience, reputation, and brand name), and human resources (4 items, namely knowledge, experience, and skill, and employee loyalty) by Ainuddin et al. (2007).

Similarly, capabilities are measured based on the AHP gradation scale, from 1 (equally important) to 9 (extremely important). A total score of 14 items in the questionnaire was employed as the basis for measuring organizational capabilities. The main elements include informational capabilities (3 items comprising the human resources training program, contact and employee job rotation) and technological capabilities (4 items consisting of the acquisition-the search for new technology, assimilation-understanding of new technology, the transformation-seeing of how new technology can be used in the context of the firm's issues and existing technology, and the application-implementation of actions enabled by new technology). Product-development capabilities (3 items including R&D capacity, adoption of new manufacturing methods, and product promotion and marketing activity) and relationship-building capabilities (4 items including networking transparency, effective communication, building interdependence, and trust in relationships).

Finally, open innovation components of the organization are measured based on the AHP gradation scale, namely from 1 (equally important) to 9 (extremely important). A total score of the 10 items in the questionnaire was employed based on the measurement of open innovation. The main

elements include internal paths (5 items emphasizing internal R&D, ideas from employees, complaints systems, customer service, and salesforce) and external paths (5 items focusing on customers, lead users, patents/inventors, competitors, and suppliers).

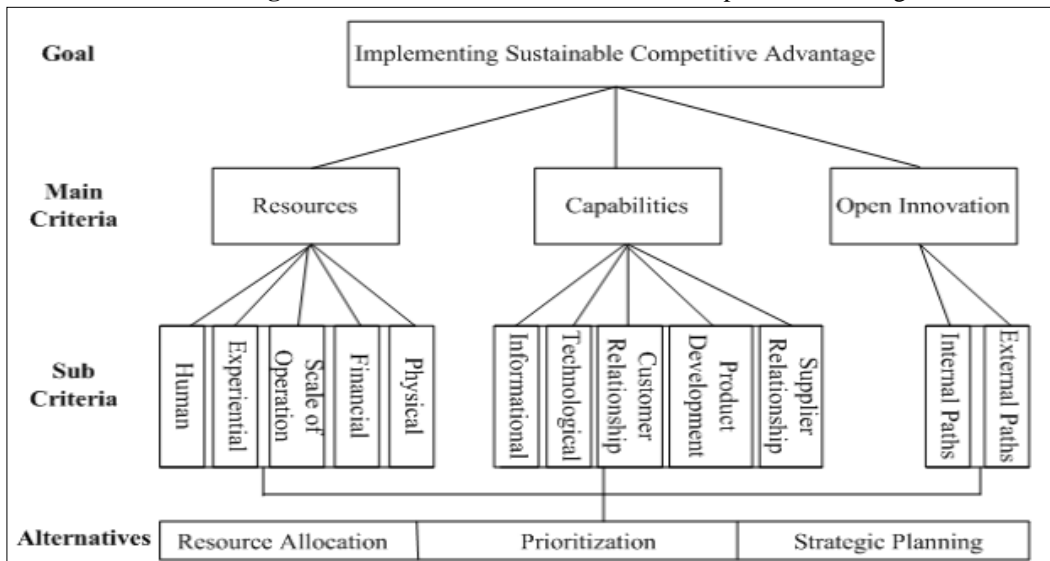
## 5. RESULTS

### 5.1 Analytical hierarchy network

This paper aimed to investigate the application of the analytical hierarchy process (AHP) to the difficulties associated with strategic decision-making in developing a sustainable competitive advantage. An analytical hierarchy process is a well-articulated approach based on sound mathematical ideas. This process methodically organizes experience, intuition, and heuristic-based decision-making into a hierarchical structure. The AHP is valuable for drawing quantitatively sound conclusions about business strategy. It lays forth a well-defined process for overcoming the challenges associated with decision-making. Higher-quality solutions to complex decision-making issues provide economic justification for the time spent in the decision-making process. The first step in the AHP process involves establishing a hierarchical structure, as shown in Figure 2.

### 5.2 Implementation of sustainable competitive advantage

**Figure 2:** AHP structure for sustainable competitive advantage



Source: Authors' compilation (2023)



The hierarchical structure above illustrates the implementation process levels toward an organization's sustainable competitive advantage. The goal is to implement sustainable competitive advantage by integrating the three strategic facets, namely, resources, capabilities, and open innovation, that form the foundation of this study. The resources facet consists of human, experiential, scale of operation, financial, and physical factors. In human resources, we are interested in understanding the importance of knowledge capacity, skill level, and employee loyalty to the organization. For experiential, we are concerned with the manufacturing experience, the reputation of the product and the organization, and the brand name necessary for marketing objectives. Financial resources are the core of the survival and operations of an organization. The financial streams' capital, liquidity, and accessibility comprise organizational financial resources. Finally, physical resources are tangible assets that the organization requires to produce goods and services, including machinery/equipment, the capacity of facilities, flexibility of assets, and production technology.

Organizational capabilities include the following factors: informational, technological, supplier and customer relationships, and product development. In informational capabilities, the inquiry makes the organization and staff members competent and informed with organizational dealings through training programs, contact between different departments, and job rotations. Technological factors encompass acquisition - *searching for new technology*; assimilation- *the broader corporate context is highly supportive in the understanding of new technology*; transformation- *observations of how new technology can be used in the context of the firm's issues and existing technology*, and application- *ensuring that the implementation of actions enabled by new technology is well fitted into the organizational process*. Supplier and customer relationships are concerned with networking and marketing by embracing transparency, effective communication, building interdependence between partners/alliances, and trust. Product development capabilities arise from research and development; marketing activities lead to opportunity discovery. The organization moves forward in providing solutions to the opportunities discovered, and the engineering department responsible for the production process can perform sophisticated tasks to produce an innovative product with high market demands.

Open innovation is centred on the internal and external paths of innovation. Internal paths expand the organization's internal ideas from customer service, employees' involvement in strategic decision-making and empowerment, internal R&D, complaints systems, and the sales force. External paths are essential for acquiring exterior ideas from customers, lead users (user solutions), patents/inventors, competitors, suppliers, and acquisitions.

### 5.3 AHP matrices

**Table 2:** Pairwise comparison of the main criterion–goal-oriented

| <i>SCA Implementation</i> | <i>Resources</i> | <i>Capabilities</i> | <i>Open Innovation</i> | <i>NEV</i>   |
|---------------------------|------------------|---------------------|------------------------|--------------|
| Resources                 | 1                | 1.00                | 3.00                   | <b>0.429</b> |
| Capabilities              | 1.00             | 1                   | 3.00                   | <b>0.429</b> |
| Open Innovation           | 0.33             | 0.33                | 1                      | 0.143        |

CR = 0% OK

The results from the AHP analysis show that organizational resources and capabilities are equally important, and they are marginally more substantial than open innovation toward implementing sustainable competitive advantage for an organization. Both resources and capabilities priorities are rated at 0.429 (42.9%) normalized eigenvector (NEV), while open innovation is rated at 0.143 (14.3%) NEV. CR is the consistency ratio that is 0%, meeting Saaty's requirement of a consistency ratio of 10%. Therefore, pairwise comparison outputs are correct and recommended for decision-making.

**Table 3:** Pairwise comparison of resource-related behaviors

| <i>Resources</i>       | <i>R1</i> | <i>R2</i> | <i>R3</i> | <i>R4</i> | <i>R5</i> | <i>NEV</i>   |
|------------------------|-----------|-----------|-----------|-----------|-----------|--------------|
| Human (R1)             | 1         | 3.00      | 1.00      | 0.50      | 2.00      | 0.195        |
| Experiential (R2)      | 0.33      | 1         | 0.50      | 0.17      | 0.50      | 0.068        |
| Operational Scale (R3) | 1.00      | 2.00      | 1         | 0.33      | 3.00      | 0.184        |
| Financial (R4)         | 2.00      | 6.00      | 3.00      | 1         | 6.00      | <b>0.462</b> |
| Physical (R5)          | 0.50      | 2.00      | 0.33      | 0.17      | 1         | 0.091        |

CR = 2.3% OK

The AHP outputs from pairwise comparisons within the resources facet show financial aspects and the importance ratings (0.462) obtained from the NEV column. Financial resources are succeeded by human (0.195), operational scale (0.184), physical (0.091), and experiential (0.068), respectively, in the order of importance toward the resource's component. The CR for the pairwise comparison is below 10%, which is good. 46.2 % of all organizational resources are attributed to financial resources, which shows how strategically important it is to implement SCA.

**Table 4:** Pairwise comparison of capabilities-related behaviors

| <i>Capabilities</i>        | <i>C1</i> | <i>C2</i> | <i>C3</i> | <i>C4</i> | <i>C5</i> | <i>NEV</i>   |
|----------------------------|-----------|-----------|-----------|-----------|-----------|--------------|
| Informational (C1)         | 1         | 0.33      | 0.25      | 0.50      | 0.33      | 0.067        |
| Technological (C2)         | 3.00      | 1         | 0.50      | 4.00      | 4.00      | 0.288        |
| Customer Relationship (C3) | 4.00      | 0.50      | 1         | 7.00      | 4.00      | <b>0.441</b> |
| Product Development (C4)   | 2.00      | 0.25      | 0.14      | 1         | 0.50      | 0.078        |
| Supplier Relationship (C5) | 3.00      | 0.25      | 0.25      | 2.00      | 1         | 0.126        |

CR = 6.3% OK

The organization's capabilities show the importance of building customer relationships, which should be a priority for organizational capabilities. The ranking of importance is as follows: first, customer relationship (44.1%); second, technological prospect (28.8%); third, building a solid supplier relationship (12.6%); fourth, product development capabilities (7.8%); and fifth, informational capabilities rated 6.7% in comparison order of importance. Finally, the CR is 6.3%, which is acceptable.

**Table 5:** Pairwise comparison of open innovation-related behaviors

| <i>Capabilities</i> | <i>Internal Paths</i> | <i>External Paths</i> | <i>NEV</i>  |
|---------------------|-----------------------|-----------------------|-------------|
| Internal Paths      | 1                     | 1.00                  | <b>0.50</b> |
| External Paths      | 1.00                  | 1                     | <b>0.50</b> |

CR = 0% OK

Open innovation efforts focus on inside-out and outside-in streams of ideas. The results show a 50/50 percent difference between internal and external innovation paths. As much as an organization wants to acquire outside expertise, know-how and technologies are equally crucial to trade-off resources or technologies that are redundant to the organization's operations. Furthermore, the CR is perfect at 0%.

**Table 6:** Decision hierarchy

| Goal                | Main Criterion                  | Sub-Criterion                   | Global Priorities | Resource Allocation | Prioritization | Strategic Planning |
|---------------------|---------------------------------|---------------------------------|-------------------|---------------------|----------------|--------------------|
| Implementing SCA    | Resources = <b>0.4286</b>       | Human<br>0.1951                 | 8.4%              | 0.0578              | 0.0182         | 0.0076             |
|                     |                                 | Experiential<br>0.0681          | 2.9%              | 0.0026              | 0.0209         | 0.0057             |
|                     |                                 | Operational Scale<br>0.1844     | 7.9%              | 0.0188              | 0.0108         | 0.0494             |
|                     |                                 | Financial<br>0.4618             | <b>19.8%</b>      | 0.0446              | 0.0199         | 0.1333             |
|                     |                                 | Physical<br>0.0906              | 3.9%              | 0.0173              | 0.0173         | 0.0043             |
|                     | Capabilities = <b>0.4286</b>    | Informational<br>0.067          | 2.9%              | 0.0078              | 0.0024         | 0.0185             |
|                     |                                 | Technological<br>0.2883         | 12.4%             | 0.0309              | 0.0309         | 0.0618             |
|                     |                                 | Customer Relationship<br>0.4414 | <b>18.9%</b>      | 0.0631              | 0.0631         | 0.0631             |
|                     |                                 | Product Development<br>0.0775   | 3.3%              | 0.0147              | 0.0129         | 0.0056             |
|                     |                                 | Supplier Relationship<br>0.1257 | 5.4%              | 0.018               | 0.018          | 0.018              |
|                     | Open Innovation = <b>0.1429</b> | External Paths<br>0.5           | 7.1%              | 0.0119              | 0.0119         | 0.0476             |
|                     |                                 | Internal Paths<br>0.5           | 7.1%              | 0.0119              | 0.0119         | 0.0476             |
| <b>Alternatives</b> |                                 |                                 | <b>1.0</b>        | <b>29.9%</b>        | <b>23.8%</b>   | <b>46.3%</b>       |

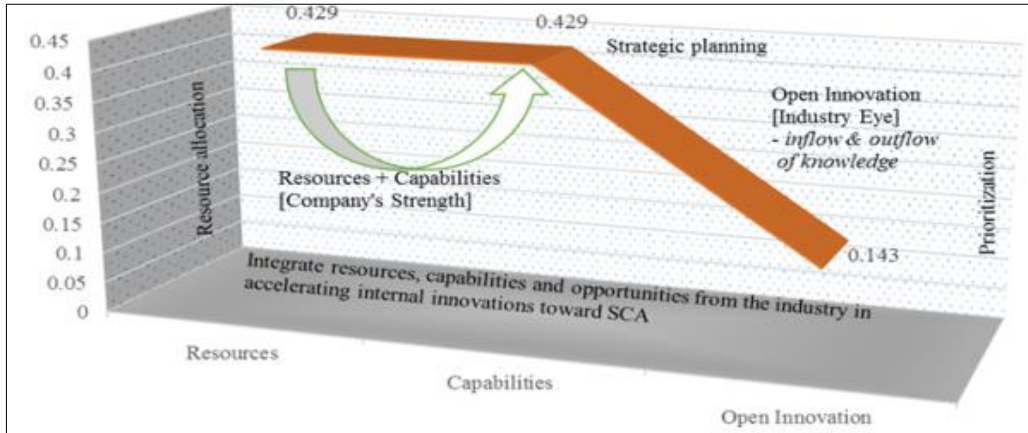
*Source:* Authors' compilation from the AHP analysis (2023)

The consolidated alternatives decision hierarchy indicates that 46.3% of the organizational resources, capabilities, and open innovation activities should be directed to strategic planning, i.e., integrating past results into current ones to shape the future SCA continuously. 29.9% of the organization's efforts and time from resources, capabilities, and open innovation should be concerned with allocating resources effectively at the correct timing and the right SCA facilitating areas of operation. 23.8% is for prioritization. A prioritization strategy is essential for organizational flexibility in implementing SCA by considering unforeseeable risks. Some AHP outputs are observed from the results. For instance, human is highly significant for resource allocation at 0.0578. This implies that devoting the right skilled employees to specific tasks is the root of implementing an organizational SCA. The technological factor is highly significant (0.0618) in strategic planning. The speed of technological change is high; therefore, an

organization implementing SCA should consider strategic planning as the guiding tool to avoid being wedged by the wave of technological change, which can be drastic for entire business operations.

### 5.1.3 Integrated SCA implementation model

**Figure 3:** Integrated SCA implementation model



Source: Authors' compilation (2023)

The model shows the integration of resources, capabilities, and open innovation toward SCA during the implementation phase. The three alternatives, resource allocation, prioritization, and strategic planning, are embedded in the holistic SCA implementation process. Organizational resources and capabilities represent the strengths of an organization's standing. At the same time, open innovation is the organization's "industry eye" that seeks new technologies, know-how, and organizational growth and sustainability opportunities.

The provisional formula for the implementation of the SCA:

$$iSCA\ index = 1 - \max \left\{ \left[ \frac{1}{3} - R \right], \left[ \frac{1}{3} - C \right], \left[ \frac{1}{3} - O \right] \right\}$$

Whereby;

iSCA: *Implementation of sustainable competitive advantage*

R: *Resources*

C: *Capabilities*

O: *Open Innovation*

The RCO technique represents resources, capabilities, and open innovation. Therefore, the organization must maximize the resources, capabilities, and innovations required to achieve SCA implementation to produce customer value.

## 5.2 Hypothesis testing

During the implementation phase of the SCA, it is vital to use resources and capabilities efficiently and effectively. Implementation is the execution of a decision or plan. Execution is achieved through performance, enactment, and administration of organizational capabilities, while open innovation is integrated into the holistic process.

*H1<sub>a</sub>: Organizational resources are considerably more critical than capabilities toward implementing sustainable competitive advantage.*

The null hypothesis ( $H0_a$ ): Organizational resources are considerably less critical than capabilities. Since the normalized eigenvectors (NEV) for resources and capabilities are 0.4286, the null hypothesis cannot be rejected because resources are considerably more critical than capabilities. However, they are considered equally important for SCA implementation. Therefore, we reject hypothesis  $H1_a$ .

*H1<sub>b</sub>: Organizational resources are considerably more important than open innovation in implementing sustainable competitive advantage.*

The null hypothesis ( $H0_b$ ): Organizational resources are less critical than open innovation in implementing sustainable competitive advantage. The normalized eigenvector for resources is 0.4286, and that for open innovation is 0.1429. In this regard, the null hypothesis is rejected. Consequently, hypothesis  $H1_b$  is accepted. Resources are more important than open innovation in the production process during SCA implementation. Lastly, open innovation upgrades internal resources and knowledge by acquiring external resources and knowledge, making it an essential aspect of the holistic SCA implementation process.

*H1<sub>c</sub>: Organizational capabilities are considerably more important than open innovation in implementing sustainable competitive advantage.*

The null hypothesis ( $H0_c$ ): Organizational capabilities are considerably less critical than open innovation in implementing sustainable competitive advantage. The null hypothesis is rejected because the normalized eigenvector for capabilities is 0.4286, and open innovation is 0.1429. Thus, we accept hypothesis  $H1_c$ .

## 6. DISCUSSION AND CONCLUSION

### 6.1 Implications for the theory

The results showed that integrating organizational resources, capabilities, and open innovation significantly positively affects implementing a sustainable competitive advantage. This finding supports and extends RBV, dynamic capability, and open innovation theory. This study compares the effects of the *RCO technique* to sustain competitive advantage. The comparative effect is analyzed using the analytical hierarchy process (AHP) to determine the normalized eigenvectors that indicate the component priorities from which strategic implementation decisions can be made.

The RBV of competitive advantage is supported and expanded upon by this research, which demonstrates the need for a systematic management of resources and capabilities that is efficient and effective in creating competitive advantage. The VRIO supports the value of the organizing element in the RBV of competitive advantage. (Value, Rarity, Imitability, and Organization) framework (Barney, 1991; Wernerfelt, 1984). In addition, it demonstrates that by observing these variables (resources, capabilities, and open innovation) in the integration, they are statistically significant toward SCA. Nonetheless, they may lose a competitive advantage in their relationships based on the conducted pairwise comparisons of the AHP procedure. However, The implications of these findings do not suggest that a component's value in attaining a competitive advantage is negligible merely because it is less significant than the other. Instead, they precisely reflect the decision makers' (managers') perceptions of the relative significance and classification of these variables (resources, capabilities, and open innovation) independently. In other words, the results demonstrate the significance of organizational resources, capabilities, and open innovation in terms of competitive advantage.

Managing multiple sources and collaborators for innovation and the effect of open innovation on innovation performance is crucial for an organization to attain a sustainable competitive advantage (Gonyora et al., 2021). The importance of open innovation practices and the imperative for companies to modify their organizational and managerial frameworks to address the complexities of open innovation are widely recognized in the current corpus of research (Gonyora et al., 2021; Rauter et al., 2019). Scholarly discourse widely acknowledges the significance of open innovation practices and the imperative for organizations to effectively adapt their managerial and organizational models to address the challenges associated with open innovation. A correlation has been established between an organization's degree of transparency and financial performance (Lu, 2022; Asa & Prasad, 2015; Milezi et al., 2023). Family firms benefit from collaborating with consumers in domestic markets; however, the extent to which this relationship is influenced is contingent upon the firm's scale (Belitski, 2022). Various factors influence the adoption of open innovation, including organizational citizenship behaviors, transactional costs, managerial relations, and organizational culture (Annamalah et al., 2022). Inbound innovation practices, such as collaboration between universities and industries and in-licensing of intellectual property, contribute to creating sustainable value, especially with internal R&D activities within the organization (Milana, 2022). However, additional investigation is necessary to harmonize and synchronize the current body of knowledge regarding open innovation, specifically regarding its attributes and tiers of analysis (da Silva Meireles, 2022).

The resource-based perspective (RBP) has been criticized for failing to address how resources are allocated consistent with the dynamic market environment (Priem et al., 2001). The RBV generally argues that sustainable competitive advantages derive from possessing valuable, rare, inimitable and nonreplaceable (VRIN) resources (Barney, 1991; Wernerfelt, 1984). On the other hand, the dynamic capabilities (DC) approach maintains that more significant VRIN resources do not automatically lead to higher performance over time. Instead, the capacity to acquire and use the resources of enterprises in ways that are compatible with the ever-changing environment is what leads to persistent competitive advantage (Eisenhardt & Martin, 2000; Makadok, 2001; Morgan, 2009; Teece et al., 1997; Eisenhardt & Martin, 2000; Makadok, 2001; Teece et al., 1997; Kabango & Asa, 2015). Business organizations deploy organizational capabilities such as skills and collected knowledge to cope with technology, build connections with customers and suppliers, and

participate in product development to achieve better performance. These capabilities enable organizations to achieve their goals of superior performance. They are often ingrained in organizational processes, making it possible for firms to coordinate their operations more effectively than they do (Gutiérrez-Martínez & Duhamel, 2019; Asa et al., 2013).

It is common practice to consider capabilities and resources equally important in pursuing organizational performance (Vorhies & Morgan, 2005; Ahunjonov et al., 2013). Capabilities are skills ingrained in a well-defined process to produce, manage, and exploit VRIN resources. Therefore, capabilities are dynamic (Vorhies & Morgan, 2005). The study findings also consider capabilities as the procedures and routines associated with those activities at which the VRIN is translated into lucrative actions (such as cultivating client connections) that a firm can conduct more effectively than its rivals. Firms with superior marketing capabilities (informational) typically demonstrate exceptional business performance (Han et al., 1998; Krasnikov & Jayachandran, 2008; Vorhies & Morgan, 2005). In addition, these capabilities are valuable, ingrained, and difficult to mimic, and they can provide organizations with sustainable competitive advantages (Gutiérrez-Martínez & Duhamel, 2019). One of the most significant marketing competencies relates to customers. This capability enables companies to harness the resources connected to customer relationships to establish sustainable advantages over competitors. This research focuses on putting SCA into practice by aligning resources, capabilities, and open innovation with strategic planning, resource allocation, and prioritization, which are the three core drivers of company operations.

## ***6.2 Implications for practice***

The practical implications of the findings, which centre on operational and implementation strategies, assist organizational management in making informed and structured decisions through the identification of critical variables that contribute to the attainment of a sustainable competitive advantage. The empirical findings show that businesses need sound work systems to structure their resources and competencies to maintain competitive advantage. To obtain customer acceptance and loyalty, organizations must improve R&D and marketing to acquire a competitive edge. In addition, organizations must further optimize their total resources, particularly their human and material assets. In addition, they should promote a healthy working environment, implement key performance indicators (KPIs) in their SCA-related operations, and encourage employee collaboration. Networking or interactions should strengthen the organization's relationship with suppliers and distributors. In terms of organizational policy, the findings of this study could assist policymakers in determining which internal characteristics should receive greater emphasis or priority than others. For instance, to gain a cost advantage, the company must improve its work, manufacturing, or production systems to take advantage of economies of scale. Financial policies should receive a great deal of attention within an organization because they are intertwined with every business operation and strategy to enhance its overall competitive advantage and performance. In addition, for companies to advance their R&D strategies and enhance their public relations, they must do so to acquire a competitive edge over their competitors. This study extended and strengthened the theoretical discourse on the RBV of competitive advantage by empirically illustrating the magnitude of the relationships between organizational resources, capabilities, and open innovations perceived by experienced decision-makers as contributing to competitive advantage. This study's contribution to the literature has further extended and strengthened the theoretical discourse on the RBV of competitive advantage.



The general contributions from the findings of this study are as follows.

First, the study proved that organizations must pay attention to organizational capabilities because they deal with employees' skills and knowledge in using resources to implement SCA effectively. Furthermore, capabilities are unique. Therefore, they are difficult to imitate by competitors, making them significant in attaining sustainable competitive advantage.

Second, since the study is conducted on experienced top management personnel, they are decision-makers who embrace strategic planning and are inspirational coaches, collaborators, and explicit motivators. Failing to have this archetype in leaders predicts the future demise of organizations. Therefore, the analysis in this study contributes toward equipping leaders in strategic thinking as the drivers of organizations.

Third, possessing abundant resources cannot guarantee a competitive advantage. This study has shown that accountability is required to ensure that skilled personnel are in the right place at the right time to complete projects/priorities with adequate resources. The abundance of resources without the right skilled people to use those resources effectively and efficiently does not positively impact organizational performance and competitiveness.

In conclusion, although the research focused solely on experts in the manufacturing sector in a developing economy, it provides an overall picture of an organization embarking on implementing a sustainable competitive advantage.

**Table 7: Countermeasures**

| <b>Assumption</b>   | <b>Result</b> | <b>Practical</b>   |
|---|---------------|--|
| Organizational resources are considerably more critical than capabilities in implementing sustainable competitive advantage.        | Not Supported | Managers should capitalize on valuable, rare, inimitable, and non-substitutable resources and ensure that resources are allocated to important tasks.  |
| Organizational resources are considerably more important than open innovation in implementing sustainable competitive advantage.    | Supported     | Although the results show the significance of resources over open innovation due to the nature of industries in developing economies, managers still need to pave ways for open innovation flows to bolster their strategic organizational resources and capabilities. |
| Organizational capabilities are considerably more important than open innovation in implementing sustainable competitive advantage. | Supported     | Exposing employees to practical training and developments is imperative to instil the unique skills and knowledge required to best utilize resources innovatively toward the intended objectives (SCA).  |

An integrated model of SCA has been developed through extensive data analysis on which organizations' decision makers (managers, executives, board of directors, and senior team

management) can base their decisions, strategies, and practices to attain sustainable competitive advantage. The findings apply to accurate business decisions, but generalization is not recommended as industries and business environments differ and consider the dynamics of markets from time to time. The study concludes that open innovation and unique capabilities are vital to effectively using resources toward an organization's sustainable competitive advantage.

### **6.3 Limitations and research directions**

Notwithstanding the importance and impact of this investigation on various stakeholders and other entities, it, similar to other scientific inquiries, possesses intrinsic constraints that warrant further investigation. First, the generalizability of the study's findings is limited due to their focus on developing economies that still require further attention in the realms of innovation and technological progress. This is related to the nature of developing economies' businesses and environments, which vary considerably. Second, this study focused heavily on the opinions and experiences of executives and managers involved in decision-making rather than studying situations to observe the real-world conditions connected with implementation, such as project priority and resource allocation. Third, the study focused on important decision-makers during a typical business cycle, excluding situations in which crises influence managers' actions. As a result, more research is needed to examine decisions or managerial abilities before, during, and after a crisis to establish a lasting competitive advantage using the same study components. We employed the AHP model to determine the relevance of numerous aspects and linkages to construct an operational SCA system. However, while calibrating analytical models in manufacturing will be a continuous and challenging task, intensive case studies addressing SCA issues will fill the gap with rich knowledge and actual concrete behavior. Alternatively, decision makers' judgments can be measured to determine the true impact of their decisions and strategies on organizational performance. Analytical models are critical tools for analyzing the relevance and practicability of the results in manufacturing contexts. Lastly, studies on other sectors are still open for further research.

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