



A Critical Supply Chain Innovation Indicators that Enhance Business Performance: A Case Study of Weir Minerals Africa

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ABSTRACT

The principal link between technology and competitive advantage is innovation. The quest for sustainable competitive advantage has caused firms to invest in innovation, consequently, innovation is responsible for new industries coming into being, and it is innovation, which allows some firms to dominate in that space. Thus, this study aimed to examine the critical supply chain (SC) innovation indicators that enhance business performance. This research study centred on the operational activities of the Weir Minerals Africa (WMA) Isando facility in Johannesburg, South Africa, including all elements associated with the supply chain activities of the plant. The study sample of 230 respondents was considered representative of the population. The philosophical worldview in this research is positivism. Positivism hinges on computable observations that lead to statistical interpretations. The study was quantitative, adopted the deductive research approach, and a set of hypotheses were formulated for the research to confirm or reject a theory. For this population, the researcher applied a census-based sampling approach. The results showed that there is a significant number of indicators that enhance business performance and these include a clear culture of continuous improvement, focusing on new markets both locally and globally, product portfolio changes, constant connection and engagement with customers and cost structures. In light of these findings, the study provided a set of recommendations. Weir Minerals has a significant number of supply chain innovation hubs and metrics that include improvement and innovation culture across the entire organisation, an aggressive drive to create new markets and a clear posture to enforce standards and consistent value to its customers. However, it has not made a significant and noticeable effort to connect regularly with its customers. It has to improve on its customer relationship management frontier. The study findings underscored the relevance of a holistic overview of the supply chain problems at Weir Minerals Isando (WMI) that may inform the supply chain management decisions and expand academic knowledge.

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INTRODUCTION

While most business academics believe that innovation is critical to an organisation's survival and success, empirical findings on the performance consequences of company innovativeness vary greatly among studies, with researchers reporting positive, non-significant, and even negative relationships. This discrepancy in findings shows that a more rigorous conceptual refinement, as well as more nuanced, contextualised links between company technology adoption and performance, is required. To that aim, a thorough examination of the literature reveals the need for a better understanding of the link between innovation adoption and company

performance, as well as an opportunity for more research.¹ In this regard, innovation is one of the potent tools that firms can deploy to retain their competitive advantage and enhance business performance. Although it has been observed that most organisations and supply chains have now eliminated outmoded supply chain and operations approaches, namely lean manufacturing and total quality control, supply chain innovation has become decisive for any business to reach out to new prospects in order to sustain competitive advantages in the vibrant supply chain space.²

The sustainability activities are tracked and captured on dashboards installed within the system within the organisational architecture. Furthermore, the study in this case focuses on the dynamics of performance improvement connected to sustainability. As a result, in an organisational environment, these activities are primarily focused on creating value for the corporation's various stakeholder groups. Within this framework, a general conceptual discussion is offered, and related propositions are further articulated to throw light on existing and future research areas. Quantitative evidence drawn from the meta-analysis point out that organisational eco-innovation put forth the strongest impact on firm performance.³ The contention is that organisations that develop and adopt innovative supply chains can subsequently sustain their performance.

Weir Minerals Africa (WMA), a local South African firm established in 1951, has operations in all five continents in the world. Weir Minerals Africa is the flagship of the African region, headquartered in Alrode, Johannesburg, South Africa. WMA has nine branches in African countries with Weir Minerals Isando (WMI) being the only branch focused on manufacturing. WMI supplies all the branches in Africa and the Middle East. In this study, the focus is on the WMI manufacturing facility in South Africa. WMA has, as of 2010, been struggling to render first-rate services in the implementation of its supply chain strategy.⁴ The company has had its fair share of supply chain-related challenges. For instance, poor reaction to supply chain and inability to meet order-to-cycle delivery times mainly due to lack of supply chain innovation (SCI) oriented solutions to resolve the current teething troubles bedevilling the organisation which led to supply chain related complications: late shipments, material shortages, schedule changes and capacity problems that have often escalated into supply chain disruptions.⁵ According to WMA, the company has experienced significant material shortages due to the strong economic recovery since the advent of the coronavirus (COVID-19) pandemic and shortage of vessels and containers resulting in an average material cost price increase of over 80%.⁶ Furthermore, the firm continues to witness a decline in its internal capacity as evidenced by the increase in the number of outsourced suppliers from 12 to 19 from year 2019 to 2020. There has not been a digital system specifically designed to assist configured collaboration and smooth workflow management between supply chain teams from within the organisation and the external supply chain partners.⁷ It is pertinent that a comprehensive study be conducted to explore ways to enhance WMA's supply chain management and overall business performance. The current research therefore endeavours to examine critical supply chain innovation indicators that enhance business performance. The study seeks to examine supply chain innovation (SCI) as an enabler of sustainable business performance at WMA. The study objectives are as follows/ detailed below:

- Identify the critical supply chain innovation indicators that enhance the business performance of Weir Minerals Isando.
- Determine the most important drivers of sustainable business performance when executing the SC innovation strategy of Weir Minerals Isando.
- Determine and establish the levels of influence of SC innovation enablers on value creation at Weir Minerals Isando.
- Determine and develop a framework for implementing SC innovation best practices at WMI.

¹ W. K. Story, "Impact of Supply Chain Technology Response Capability on Firm Performance and Supply Chain Technology Performance" (University of Memphis, 2016).

² L. Bo and L. Yulong, "Internet of Things Drives Supply Chain Innovation: A Research Framework," *International Journal of Organizational Innovation* 9, no. 3 (2017): 71–92.

³ Ayça Kubra Hizarci-Payne, İlayda İpek, and Gülüzar Kurt Gümüş, "How Environmental Innovation Influences Firm Performance: A Meta-analytic Review," *Business Strategy and the Environment* 30, no. 2 (2021): 1174–90.

⁴ The Weir Group PLC, "Annual Report and Financial Statements 2016," https://www.annualreports.com/HostedData/AnnualReportArchive/t/LSE_WEIR_2016.pdf, 2016.

⁵ The Weir Group PLC, "Annual Report and Financial Statements 2016."

⁶ The Weir Group PLC, "Annual Report and Financial Statements 2020," <https://www.global.weir/siteassets/pdfs/newsroom/the-weir-group-plc-2020-annual-report--accounts.pdf>, 2020.

⁷ The Weir Group PLC, "Annual Report and Financial Statements 2020."

LITERATURE REVIEW

Synopsis of Supply Chain Innovation

Supply chain management (SCM) frequently considers how to control the flow of information and resources from "suppliers' suppliers to customers' customers." In fact, it refers to improved information sharing, shared resources, and win-win interactions among the chain's participants. The Institute for Supply Management definition of SCM as employed in this study states that it is, the design and administration of seamless, value-added processes across organisational boundaries to suit the genuine demands of the end customer. SC innovation is required for the following reasons: (a) acquiring a competitive advantage in the market; (b) controlling the many types of risks that exist in the supply chain; and (c) anticipating the various sorts of uncertainties that exist in the surrounding environment.⁸

Firms must, however, assess their varied logistical capabilities and link them appropriately in order to establish creative supply chains. Firms cannot develop an innovative supply chain without integrating the dominant logistics capabilities, such as demand management interface capability, supply management interface capability, information management capability, and coordination capability, because logistics is such an important part of the supply chain.⁹ Arlbjørn and Paulraj proposed a complete definition of SC innovation in their literature assessment on the subject.¹⁰ SC innovation is a change (gradual or radical) in a supply chain network, supply chain technology, or supply chain process (or a combination of these) that can occur in a company function, within a company, in an industry, or in a supply chain to enhance new value creation for stakeholders. This definition clarifies several important aspects of SC innovation, a) it is dynamic in nature and contains change, and b) its uniqueness varies from modest, gradual adjustments to bigger, more dramatic ones.¹¹ Also can have both intra- and inter-organizational origin; thus, it can happen within a firm (i.e., within a single corporate function), or it can happen throughout a supply chain or between sectors. SC innovation encompasses more than just the creation of something new since it encompasses the process and activities associated with the commercialization of a unique concept in a SC.

In a publication by Hahn, the scholar looked at the Fourth Industrial Revolution, commonly known as Industry 4.0 (i4.0), which is defined as the digitalization of the industrial sector.¹² The theoretical lens of supply chain innovation (SCI) was utilised in this study to evaluate the effects of i4.0 on supply chain management in order to gain a better understanding. Apparently, the structured content analysis approach is applied to over 200 selected examples of i4.0-enabled SCI offered by both respectable and start-up enterprises for all intents and purposes. I4.0-enabled SCI is primarily displayed in three dimensions, namely process, technology, and business architecture. First, i4.0-enabled SCI stretched out the original emphasis on productivity increases in SC procedures in the direction of scalability and suppleness, according to the study findings. Second, present i4.0 solutions rely on analytics and smart everyday things, while forgetting smart people technology and the i4.0 paradigm's human-centric strategy. Third, reputable going concerns typically adopt i4.0 to support the weight of their existing business architectures, despite the fact that start-up enterprises change the resulting operating models, will be unable to manage without traditional data analytics, and those markets based on digital platforms like Airbnb and Bolt. Accordingly, respected firms pursue a problem-driven, engineering-based approach to SCI, whereas start-ups pursue an "asset-light," business-driven strategy. To summarise, there are two distinct approaches to digitalizing operational SC operations: digital platform-based crowd financing of standard procedures and on-demand provision of custom services.

The Critical SC innovation Indicators that Enhance Business Performance

The ability of a firm to maintain positive performance such as positive return on capital employed (ROCE) for periods over five years is complex but a necessary dimension to understanding sustainability. The effect of critical SC innovation indicators on firm performance has been the subject of constant interest and challenge among researchers. In this study, the reviewed literature is organized and classified along four main themes:

⁸ K-J Ju, Byeonghwa Park, and Taikyoo Kim, "Causal Relationship between Supply Chain Dynamic Capabilities, Technological Innovation, and Operational Performance," *Management and Production Engineering Review* 7 (2016).

⁹ Ju, Park, and Kim, "Causal Relationship between Supply Chain Dynamic Capabilities, Technological Innovation, and Operational Performance."

¹⁰ Jan Stentoft Arlbjørn and Antony Paulraj, "Special Topic Forum on Innovation in Business Networks from a Supply Chain Perspective: Current Status and Opportunities for Future Research," *Journal of Supply Chain Management* (Wiley Online Library, 2013).

¹¹ António Carrizo Moreira, Luís Miguel D F Ferreira, and Ricardo A Zimmermann, *Innovation and Supply Chain Management* (Springer, 2018).

¹² Gerd J Hahn, "Industry 4.0: A Supply Chain Innovation Perspective," *International Journal of Production Research* 58, no. 5 (2020): 1425–41.

product clockspeed, new markets, operational excellence and firm performance and the relationship between critical SC innovation indicators and performance.

Conceptual Factors

Product clockspeed

In the first place, Fine, C. H. used the term clockspeed to distinguish between the rates of change and the evolution of distinct industry sectors. Product clockspeed refers to the rate of innovation of a product in an industry.¹³ This has demonstrated empirically that each sector has its own clockspeed pattern, in which the pace of new product introduction determines market direction, and companies will speed up or slow down their product innovation speed as a result.

A study conducted by Jajja et al used resource dependence theory to postulate that a buyer's innovation strategy improves supplier innovation emphasis and a buyer-supplier correlation that promotes the critical aspects of product innovation.¹⁴ This, in turn, has a favourable impact on buyer product innovation and company performance. Furthermore, it is proposed that the connection between a customer and a supplier governs the influence of supplier innovation concentration on product innovation in a favourable way. To evaluate the hypotheses, the researchers employed structural equation modelling and hierarchical linear regression. The findings support all assumptions, demonstrating that business (buyer) age and characteristics related with buyer participation in global marketplaces have an open influence on performance. The findings also show that the buyer-supplier relationship has no influence on the relationship between innovation method and innovation performance.

According to a study by Neto, J. Q. F. and Dutordoir, M. remanufacturing is one of the most researched topic matters in the closed-loop supply chain (CLSC) collected works.¹⁵ On the other hand, there is still a lack of understanding about the physical nature of the remanufactured product industry. Furthermore, a data set scavenged from the Internet is used to create off-the-shelf, pre-trained vectors using the Global Vectors for Word Representation (GloVe) word-entrenching approach. The Louvain approach, which is free of human interface restrictions, provides clusters based on remanufacturing and related keywords. The following key conclusions may be drawn from the research findings: To begin with, remanufacturing and related terminology are associated with certain industries and items, such as consumer electronics, treadmills, printing equipment, vehicles and automotive components, and home appliances. Similarly, several terminologies associated with remanufacturing operations, such as remanufactured, reconditioned, and rebuilt, are strongly associated with business-to-business and slow clockspeed items, whereas refurbished is strongly associated with business-to-consumer and rapid clockspeed products.

New Markets

For companies from developed countries, there is a wide range of prospects, including the strong development potential of emerging economies. Nonetheless, due to the unique character of developing economies, business strategies that help corporations gain a competitive edge in their native markets have frequently been questioned. Organizations must thus innovate and adapt their business models to match the distinctive environment of these foreign marketplaces.

Based on a longitudinal case study of a German luxury vehicle manufacturer's internationalisation to India, a phase model of the business adaption process to developing markets was established. Companies familiarise their business models in four segments, according to Landau et al: international extension, local emergence, local expansion, and local consolidation. As a result, businesses gradually adapt their business models to fit this process, resulting in the development of a local emerging market business model. Meanwhile, companies must emphasise various components of the business model in each era of the business model edition before engaging in continual adjustments of all business model components. Nonetheless, the researchers discovered that companies over-fine-tune some aspects of their business strategy more expressively than others. The findings provide particular weight to works on business model internationalisation and literature on the natural selection and sluggish nature of business model innovation.¹⁶

¹³ C. H. Fine, "Clockspeed: Winning Industry Control in the Age of Temporary Advantage," ReadHowYouWant.Com, 2010.

¹⁴ Muhammad Shakeel Sadiq Jajja et al., "Linkages between Firm Innovation Strategy, Suppliers, Product Innovation, and Business Performance: Insights from Resource Dependence Theory," *International Journal of Operations & Production Management* 37, no. 8 (2017): 1054–75.

¹⁵ João Quariguasi Frota Neto and Marie Dutordoir, "Mapping the Market for Remanufacturing: An Application of 'Big Data' Analytics," *International Journal of Production Economics* 230 (2020): 107807.

¹⁶ Christian Landau, Amit Karna, and Miriam Sailer, "Business Model Adaptation for Emerging Markets: A Case Study of a German Automobile Manufacturer in India," *R&D Management* 46, no. 3 (2016): 480–503.

In a research done by Barroso et al., the authors discovered that when entering new international markets, firms might choose between adopting an inimitable brand (integration) and adopting trademarks that are tailored to local cultures (responsiveness).¹⁷ When firms face a high level of legal obligation for originality and/or foreignness, trademark responsiveness is suitable. The level of special competition in the new foreign market, as well as the legal duty of foreignness and originality, are subject to company product diversification and the extent of specific rivalry in the new foreign market.

Study reports compiled by Kubilay and Dahlberg, make it clear that increasing academic attention has been devoted to identifying what factors predominantly foster this process, as new markets continuously emerge.¹⁸ Extraordinarily, intellectuals have combined market creation with value-creating innovations and new markets have surfaced due to the generation of unique customer value. Applying the Blue Ocean Strategy could be a shrewd tactic most importantly to such market creation incentives, based on the execution of value innovation. On the other hand, consideration of such a methodology has been somewhat disregarded in earlier published works. Meanwhile, existing literature has, as an alternative, predominantly recognised marketing incentives as the most important aiding feature of new markets, speaking of how results need to be appropriately communicated in order to gain stakeholders' confidence. In the bargain, technology development has been well thought out by academics to have a significant influence on the creation of new markets, in the wake of revolutionary inventions that would have disrupted and ripped to pieces prior industries.

Operational Excellence

Operational excellence and organisational productivity are critical components in ensuring the consistent and reliable execution of tasks required to carry out the organization's plan. Shashi recognises that digitalisation, without a doubt is the engine that fuels the growing adoption of operational excellence (OE) in manufacturing and supply chain industries.¹⁹ Technology is at the core of a quickly accelerating effort to deliver supreme transparency, proficiency and astuteness into operational decision-making. After realising the initial profits, early adopters are leading a blossoming, yet predictable, march toward the next stage of digitalisation. Edgeman found that when correctly implemented, excellence models such as the Shingo operational excellence model (SOEM), the Baldrige performance excellence model, and the European Foundation for Quality Management (EFQM) business excellence model support the pursuit of continuous superior results across a wide range of scopes.²⁰ The evidence for this claim is abundant in the literature and in practice. Nonetheless, rather than being dealt with in theory, the models tend to be driven by experience. More crucially, the investigation's major goal was to look at the foundations for such models, with the SOEM serving as a demonstration.

According to Bag et al., the primary movers in the investigation agree that operations management is a primary organisational function that entails the effective control of activities in order to produce and deliver products and services.²¹ Applicable operational choices are based on assessing and using data, an endeavour that has become much more challenging in the Big Data age. A more controlled administration of data through big data analytics (BDA), in conjunction with staff capabilities, i.e. talent competence in how big data is used, in order to assist organisations in influencing big data analytics and structural learning in favour of long-term supply chain management outcomes. The dynamic capacity theory was employed in this study to analyse the impact of BDA aptitude as an operational excellence tool for improving long-term supply chain performance. Evidence suggests that operational excellence is unswervingly linked to enhancing performance and efficiency in all spheres of sustainability such as social, environmental and economic. With a little more digging done by Henríquez-Machado et al., the authors put forward that firms are employing this inventiveness in order to remain competitive in their space.²² Earlier studies measured operational excellence only in first-world establishments. On the other hand, the productivity level in a lot of companies from developing or emerging countries is estimated to be far below the average level of companies in developed countries.

¹⁷ Alicia Barroso, Marco S Giarratana, and Martina Pasquini, "Product Portfolio Performance in New Foreign Markets: The EU Trademark Dual System," *Research Policy* 48, no. 1 (2019): 11–21.

¹⁸ Merve Beyza Kubilay and Therese Dahlberg, "Exploring Market Creation by Entrepreneurs in Sweden: How Value Innovation Fosters the Creation of New Markets," 2020.

¹⁹ Manish. Shashi, "Digital Strategies to Improve the Performance of Pharmaceutical Supply Chains" (Walden University, 2022).

²⁰ Rick Edgeman, "Excellence Models as Complex Management Systems: An Examination of the Shingo Operational Excellence Model," *Business Process Management Journal* 24, no. 6 (2018): 1321–38.

²¹ Surajit Bag et al., "Big Data Analytics as an Operational Excellence Approach to Enhance Sustainable Supply Chain Performance," *Resources, Conservation and Recycling* 153 (2020): 104559.

²² Rafael Henríquez-Machado, Andrés Muñoz-Villamizar, and Javier Santos, "Sustainability through Operational Excellence: An Emerging Country Perspective," *Sustainability* 13, no. 6 (2021): 3165.

METHODOLOGY

WMA Isando employs 230 employees therefore; the target population for this study at the time of data collection was 230 employees. For this population, the researcher applied a census-based sampling approach. Sampling was done through a non-random census method across all the supply chain processes of the Isando operation.²³ Consequently, 230 employees were chosen to participate in the study. Accordingly, supervision personnel, technicians, and artisans and floor production operatives represented all identified employees to participate as respondents.

There were two forms of data employed as sources in the investigation and/or study, namely original and already collected data. The primary data for this study was obtained from the following:

1. Responses collected with a close-ended measurable data survey tool disseminated to participants in the facility. Source of already collected data attained from the following:
2. Historical data on the subject of SC innovation and sustainable business performance.

The instrument chosen for data gathering in the study consisted of surveys. A numerical instrument namely a paper-based survey and/or mail was deemed more applicable for this research due to many employees working in the manufacturing facility who do not have access to the internet or e-mail. Most importantly, for the data collected to be quantified and adjudicated, a ranking scale technique acknowledged as Likert Scales was employed for gathering and presenting the data.

The reliability values obtained for all concepts were found to be more than 70% a good pointer for sufficient scale reliability. Results showed an overall Cronbach’s Alpha of 94.2%. An alpha value of 94.2% demonstrates a highly regarded consistency in measurement and is higher than the acceptable threshold of 70%. The researcher used Statistical Package for Social Science (SPSS) computer software to capture, analyse and draw inferential resolutions from the data.

PRESENTATION OF DATA

The Critical SC Innovation Indicators that Enhance Business Performance

The ability of a firm to maintain positive performance such as positive return on capital employed (ROCE) for periods over five years is complex but a necessary dimension to understanding sustainability. In this study, the researchers sought to identify the core supply chain innovation pointers or markers or measurements that if instituted may provide a firm with sustainable business performance. The innovation indicators are the measurement aspects that have distal goals of transforming innovative ideas into tangible products and services which customers may derive value from or whose value has been defined by the customers. Surveyed respondents were asked to offer the level of agreement with particular SC innovation metrics that include the availability of innovation programmes, nature of connection with customers, creation of new markets, the culture of continuous product improvement and ability to reinforce the firm’s product features and characteristics. The results provided as levels of agreement on a five-point Likert scale from strongly disagree to strongly agree are summarised as frequencies and percentages. Descriptive statistics was used to identify the typical responses per each SC innovation indicator. The median and the range were used to understand the central measure of the responses given as depicted in Table 1.

SC Innovation Indicators

Table 1 Distribution of SC innovation indicators at Weir Minerals (n = 135)

Table 1 Distribution of SC innovation indicators at Weir Minerals (n = 135)SC innovation indicator		Frequency	Percent	Median	Range
Continuously connect with customer in an original way	strongly disagree	7	5.2	3.00	4
	disagree	43	31.9		
	not sure	26	19.3		
	agree	39	28.9		
	strongly agree	20	14.8		
	strongly disagree	3	2.2	4.00	4
	disagree	22	16.3		

²³ Oscar Ribeiro et al., “Health Profile of Centenarians in Portugal: A Census-Based Approach,” *Population Health Metrics* 14, no. 1 (2016): 1–6.

Efficient product innovation process programme	not sure	23	17.0	4.00	4
	agree	59	43.7		
	strongly agree	28	20.7		
Reinforce features and benefits of products and services	strongly disagree	4	3.0	4.00	4
	disagree	30	22.2		
	not sure	18	13.3		
	agree	61	45.2		
	strongly agree	22	16.3		
Create new sustainable markets	strongly disagree	1	.7	4.00	4
	disagree	23	17.0		
	not sure	25	18.5		
	agree	54	40.0		
	strongly agree	32	23.7		
Culture of incremental improvement and process innovation	strongly disagree	2	1.5	4.00	4
	disagree	20	14.8		
	not sure	15	11.1		
	agree	40	29.6		
	strongly agree	58	43.0		

Source: Author (2020)

Analysis of Table 1 shows the following:

There was no clear decision among the respondents with respect to the ability of Weir Minerals Isando to connect with its customers in an original way. While 37.1% of the respondents did not perceive Weir Minerals Isando as engaging in persistent connection and interaction with its customers, a relatively equal percentage, 43.7% thought otherwise. The number of workers expressing neutrality on the point was significant at 19.3%. Responses indicated a diversion of opinions among the respondents though more were skewed towards accepting that the firm makes significant effort to regularly connect with its customers.

With respect to the institution of programmes geared at efficient product innovation, most respondents stated that the firm has made positive steps towards that. This was reflected in 64.4% of the respondents who concurred that Weir Minerals Isando has programmes towards this end. Only a meagre 18.3% thought that the firm has no clear programmes to achieve this. The study indicates that the firm has a clear SC innovation drive with respect to deliberate efforts in ensuring efficient product innovation is implemented.

Weir Minerals Isando also enforces product and service features. It ensures the benefits of the products and services are enjoyed by its customers. This was supported by 61.5% of the respondents who reported that the firm indeed enforces its product features and benefits. A median score of the responses of 4.00 with a range of 4 was recorded. This suggests that the firm has policies and procedures to ensure that the benefits and features of the product and its services are enforced and implemented.

A typical characteristic of Weir Minerals Isando is to create new markets as was depicted by the respondents' views aggregating to the median of 4.00 with a range of 63.7% of the respondents concurred that the firm is aggressive in creating new markets for its products and services. This is an indicator of the creative and innovative supply chain of the firm.

Out of 135 respondents, the majority (98) at least agreed that Weir Minerals has nurtured a culture of continuous product improvement and persistent innovation in its processes. This was also depicted by the median score of 4.00 and range of 4 suggesting that most workers at the firm are convinced that the firm has improvement and innovation drive as its beacon for supply chain innovation.

The study clearly demonstrates that Weir Minerals Isando, besides the absence of regular connection with its customer base, has a significant number of indicators to promote supply chain innovation. These include a clear culture of continuous improvement, and innovation, programmes to enforce product features and benefits to its customers, and is on an aggressive drive to create new markets for its products and services.

DISCUSSION OF RESULTS

The Critical SC Innovation Indicators that Enhance Business Performance

Weir Minerals Isando is characterised by a significant number of beacons and underlying markers for SC innovation that may predict the firm's thrust towards sustainable business performance. The study found that the firm's customer connection strategy is not clear though other markers of SC innovation are significantly

present. Market orientation theory suggests that firms have to develop clear connections and knowledge of their customers, competitors and internal integration.²⁴ Understanding customers' needs and expectations, especially in dynamic globalised markets, is indispensable. For instance, Balaji et al., argue that most Indian firms run the risk of being left behind in the contemporary global market if they do not lean towards a more operational supply chain management that recognises the role of customers in defining their business models.²⁵ Integrating business operations within the upstream supply chain demands is imperative. Firms have to connect seamlessly with customers through incorporating modern and disruptive technologies such as web-driven supply chains. Newman argues that SC innovation is stimulated by contextual factors that include the creation of new markets and constant linkage with the market.²⁶ A firm has to maintain a constant relationship with its customers so as to understand their needs and evolve the supply chain in response to dynamic market conditions. A firm that seems less connected to its market has little scope for change and is likely to miss out on fast-changing customer preferences.

One of the key indicators of SC innovation is the prevalence of clear action plans for efficient product innovation. Operational excellence is not an accident but a result of deliberate efforts by the firm to instil a culture of productivity and efficiency which minimises downtime.²⁷ Renowned scholar Edgeman reaffirms that businesses are better positioned when they invest in clear programmes of continuous improvement.²⁸ Weir Minerals Isando's deliberate programme for efficient product innovation may provide it with a unique opportunity to improve overall performance with regard to customer satisfaction and other performance dimensions.

A culture of continuous improvement is one key element depicted by Weir Minerals Isando which literature and a sample of other competitive firms have relied upon. In this research, it is proposed that SC innovation is demonstrated by a firm's adherence to norms and values of innovation. Innovative policy and practice cascade down and up the supply chain streams. These include a clear culture of continuous improvement, and innovation, programmes to enforce product features and benefits to its customers, and is on an aggressive drive to create new markets for its products and services.²⁹ Kaplan and Norton, posit that continuous improvement and SC innovation should not be perceived as events but as processes that should form a symbiotic relationship with the company's practices and behaviours.³⁰ A firm should be characterised by its norms and values that focus on customers' evolving needs and adapt processes and practices that reflect such realities. In this study, it is proposed that Weir Minerals Isando not only assumes improvements but embeds such philosophies within its practices such that they cascade down and up the supply chain. This would ensure that the SC system is adaptive to customer needs and the fast-changing technologies of the modern markets. In this way, the firm could ensure that its products and services features are engraved into the entire supply chain till the last consumer thereby reflecting policies and procedures that are not only dynamic but adaptive to changing market conditions.

The creation of new markets should form part of the lifeline of a firm, especially in fast-evolving markets and SC management demands.³¹ Weir Minerals Isando exhibits a strong bias toward an aggressive creation of new markets suggesting that it has a strong impetus for the adoption of working technologies that provide value for its customers as depicted in the proposed SC innovation model. This study proposes that a sustainable performance cannot be separated from the underlying drive for technology adoption driven by the underlying quest to satisfy existing markets and while creating capacities to meet the demands of new global markets. Aggressive creation of new markets indicates a strong supply chain innovative posture that may provide a firm with sustainable performance and a competitive edge over rivals.

Weir Minerals Isando closely implements what this study proposes as the basis and beacon of sustainable SC innovation. As depicted in the proposed framework, evidence suggests that SC innovation is hinged on underlying product clockspeed, new markets and operational excellence strands. Thus, Weir Minerals Isando's thrust on retaining customers and improving its financial and non-financial performance is attainable

²⁴ Antonio L Leal-Rodríguez et al., "Green Innovation, Indeed a Cornerstone in Linking Market Requests and Business Performance. Evidence from the Spanish Automotive Components Industry," *Technological Forecasting and Social Change* 129 (2018): 185–93.

²⁵ M Balaji, S Dinesh, and V Parthiban, "Applying Balanced Scorecards to Supply Chain Performance," *Industrial & Systems Engineering at Work Magazine* 50, no. 11 (2018): 42–47.

²⁶ W. Newman, *Automotive Supply Chain Leaders: Winning in Supply Chain during a Time of Industry Disruption*. (Los Angeles: Digitalist, 2018).

²⁷ Shashi, "Digital Strategies to Improve the Performance of Pharmaceutical Supply Chains."

²⁸ Edgeman, "Excellence Models as Complex Management Systems: An Examination of the Shingo Operational Excellence Model."

²⁹ Mohan Rao et al., "Improving Competitiveness through Performance Evaluation Using the APC Model: A Case in Micro-Irrigation," *International Journal of Production Economics* 195 (2018): 1–11.

³⁰ Robert S Kaplan and David P Norton, *A Estratégia Em Ação: Balanced Scorecard* (Gulf Professional Publishing, 1997).

³¹ Raine Isaksson, Peter Johansson, and Klaus Fischer, "Detecting Supply Chain Innovation Potential for Sustainable Development," *Journal of Business Ethics* 97 (2010): 425–42.

as reflected in its clear focus on customers' expectations and new market drive. However, it remains at risk with respect to its unclear relationship with existing customers. Constant connectivity with customers provides the firm with channels to tap into the dynamic and evolving global market conditions which then helps to reinforce SC innovation. Probably the lack of clear understanding of the implications of each programme of action by Weir Minerals especially with respect to the adoption of efficient cost structures and regular product portfolio changes might be incurring costs for the firm that do not influence overall firm performance. For instance, the firm's thrust to continually change products without a clear connection with its customers creates the threat of producing commodities that might not easily sell. This could be one reason why the firm continues to pursue new markets without maintaining existing customer interests. The proposed framework suggests that new markets are the stepping stone for SC innovation while ignoring the need for maintaining regular connections with existing customers. Since Weir Minerals Isando is focused on new markets both locally and globally, it means it has to care more about ensuring value is delivered than an internal focus on cost structures. Cost structures are only sustainable for markets with declining sales.³²

The Critical SC Innovation Indicators

Weir Minerals Isando has to change some of its current efforts that do not directly or indirectly affect its future business continuity thrust. For instance, it is apparent from the study results that its continued investment in efficient cost structures and its persistent focus on product portfolio changes that take place at least twice per year do not add value to the firm nor do they result in notable sustainability of the overall firm performance. The profitability and non-financial excellence of the firm are not determined from such cost structures and product changes as is currently perceived. From a resource-based view of the firm, investing in such resources will not result in competitiveness. However, Weir Minerals Isando might need to concentrate on those SC innovation indicators such as the creation of new markets marked by deep interest in maintaining a strongly connected customer base – customers that are engaged with the firm on a more consistent level. This would bring real performance that may sustain the firm in both the short and long term. Since Weir Minerals Isando is focused on new markets both locally and globally, it means it has to care more about ensuring value is delivered than an internal focus on cost structures. Cost structures are only sustainable for markets with declining sales.

RECOMMENDATIONS

Weir Minerals has a significant number of supply chain innovation hubs and metrics that include improvement and innovation culture across the entire organisation, an aggressive drive to create new markets and a clear posture to enforce standards and consistent value to its customers. However, it has not made a significant and noticeable effort to connect regularly with its customers. It has to improve on its customer relationship management frontier. The major driver of persistent connectivity with customers in the contemporary supply chain is the ability to harness modern information communication technologies. This improves communication and interactivity with both the supply chain upstream and downstream.

CONCLUSION

Weir Minerals Isando has significant supply chain innovation strategies that it has embarked upon but requires to improve significantly on other dimensions such as the characteristic constant connection with its customers. The model is a novel framework that holistically integrates SC innovation enablers and drivers with its ability to create, propose, capture and deliver value to its stakeholders stimulating the firm to sustain its performance. The SC innovation framework underscored the need for the firm to reconfigure its resources, particularly its intangible set of assets that include supply chain innovation stature. However, findings from the study and the framework indicate that the linear relationship of the constructs of the framework does distort some of the realities with respect to attaining sustainable performance. One of the key contributions of the framework is for Weir Minerals Isando to understand the enabling factors such as the continued focus on customers, creation of new markets, attaining operational excellence and product clockspeed. These underlying factors form part of the firm's resources that should be harnessed. The firm has to pay attention to connecting constantly with its markets, especially given its global thrust to entice new markets. The increasing competition in the global market and the possibility of new entrants into the local market pose a real threat that can only be minimised if the firm creates long-lasting relationships with its stakeholders up and downstream of the supply chain.

³² Morris A Cohen et al., "Saturn's Supply-Chain Innovation: High Value in after-Sales Service," *MIT Sloan Management Review* 41, no. 4 (2000): 93.

FUTURE RESEARCH

The study only focused on Weir Minerals Isando in South Africa, implying that the study results might have limited application with respect to transferability. Though the study used a large sample size to increase the statistical significance of the results, it is pertinent that the framework be applied in different contexts and even on a comparative basis so that a more holistic view of the framework is extracted. This would consequently widen the scope of the framework. Secondly, the framework suggests linear relationships among the SCI constructs, excluding the effect of other extraneous variables such as the socio-economic conditions characteristic of all firms and the entire supply chain. It is thus crucial that some more comprehensive study using other study designs be implemented to eliminate the effects of such extraneous variables on the real effect of SC innovation.

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