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The Effect of Production Planning Practices on Supply Chain Performance: A Case Study of Corteva Agriscience (Z) Ltd

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ABSTRACT
This Paper investigates the effects of production planning practices on supply chain performance at Corteva Agriscience Zambia, utilizing a case study approach with 60 actively involved employees. The study identifies key production planning practices in use which including Capacity Planning, Aggregate Planning, Operational Planning, Production Scheduling, Inventory Management, and Demand Planning & Forecasting, revealing their widespread adoption. It also examines how these practices assess supply chain performance. A multiple linear regression analysis is performed to gauge their impact, showing positive effects of Aggregate Planning, Capacity Planning, and Production Scheduling, while Materials Resources Planning (MRP) and Demand Planning & Forecasting have limited influence. These findings contribute to the supply chain management field and provide actionable recommendations for improving production planning in manufacturing organizations.

Keywords: *production planning, multiple linear regression, supply chain management, corteva, zambia*

I. INTRODUCTION

The importance of production planning in manufacturing cannot be overstated. Production planning is a pivotal process that involves the delicate balance of customer satisfaction and supplier management, as highlighted by Bradley (2017). In the fiercely competitive landscape of today, where success hinges on knowing what, how, when, where, and how much to produce (Vincent et al., 2018), effective production planning has become increasingly critical for organizations. Akhigbe (2020) underscores that optimizing production planning is fundamental for enhancing productivity and profitability, recognizing that production is the conversion of various inputs into quality outputs to achieve an enterprise's objectives (Umoh et al., 2013).

Production planning has multifaceted objectives, including departmental coordination (Biswas & Chakraborty, 2016) and the assessment of manpower, material, and equipment needs, scheduling production, coordinating inputs, and maximizing input efficiency (Kiran, 2019). An effective production planning process is indispensable for organizational efficiency (Jacobs et al., 2011), and it plays a crucial role in the competitive manufacturing market, optimizing production, and maximizing profits (Sule, 2007). Achieving a successful production plan involves components such as increased efficiency, capacity utilization, and on-time project completion.

While Supply Chain Management (SCM) has emerged as a compelling research area, addressing topics like cost efficiency, supply chain optimization, production control, inventory management, and supply chain integration (Spens & Wisner, 2014), few studies have explored the relationship between production planning and supply chain performance. This study seeks to fill this gap by establishing the link between critical production planning practices and their impact on supply chain performance indicators.

In the realm of production and manufacturing, every operation involves a combination of resources, including labor, materials, finances, and machinery (Jain & Aggarwal, 2008). Companies must align their production activities with market demands, as emphasized by Bradley (2017), who highlights the vital role of production planning in maintaining a harmonious equilibrium between customer satisfaction and supplier management.

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II. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

The literature on production planning practices sheds light on their significance in ensuring efficient and effective manufacturing operations. Production planning is a fundamental process that enables companies to transform inputs into desired outputs, aligning with their objectives (Umoh et al., 2021). It is an essential practice for organizations of all sizes to remain competitive (Afolalu et al., 2021a).

2.1 Production Planning Practices

Production planning is vital for businesses to achieve objectives by transforming inputs into appropriate outputs with desired quantity and quality (Umoh et al., 2021). Adopting production planning is essential for companies of all sizes to remain competitive, requiring significant effort (Afolalu et al., 2021a). This sequential manufacturing process ensures the availability of strategic raw materials, minimizing waste and maximizing profit (Ongbali, 2018; Elewa, 2019). Effective planning anticipates and prepares for customer orders, enhancing customer loyalty and satisfaction (Cruz, 2015). Various studies (Sucahyo, 2022; Noegraheni & Nuradli, 2016; Plinere & Aleksejeva, 2019; Vincent et al., 2018) have identified different production planning practices, which will be explored in this section to address manufacturing challenges

Production Capacity Planning: Capacity planning is recognized as a critical element of production planning, ensuring the availability of necessary resources and equipment to meet production demands efficiently and effectively (Sucahyo, 2022; Denekamp, 2022). Accurate assessment of production capacity is essential for avoiding bottlenecks and optimizing processes, leading to increased productivity and competitiveness (Reid & Sander, 2010). Wrong capacity assessments can result in legal repercussions (Adegbuyi & Asapo, 2010), emphasizing its strategic importance. Efficient allocation of capacity resources can maximize production output and profitability (Ho and Fang, 2013).

Aggregate Planning: Aggregate planning focuses on minimizing production costs and examines how existing resources can meet demand in a medium-term timeframe (Noegraheni & Nuradli, 2016; Rasmi & Türkay, 2021). It involves decisions related to employee requirements, work hours, material deliveries, production, and inventory management (Kibira et al., 2016). Effective aggregate planning is vital for good plant utilization and profitability (Heizer et al., 2017), as it significantly impacts business profitability (Fajar and Lestari, 2017; Tian et al., 2010) and customer satisfaction (Nugraha et al., 2020).

Production Scheduling**:** Scheduling is widely recognized for optimizing production processes and plant utilization (Plinere and Aleksejeva, 2019; Heizer et al., 2017). Efficient scheduling reduces costs and improves customer service by enabling faster throughput and reliable delivery (Sule, 2007). Effective scheduling is particularly vital when resources are limited and can optimize production goals with available resources. Further research is needed to explore strategies for improving scheduling processes.

Inventory Management**:** Inventory management is integral to production planning, ensuring timely delivery and quality standards (Vincent et al., 2018). Effective inventory management prevents business failure, particularly in a competitive environment (Fader, 2020). Inventory control aims to minimize expenses and is crucial for managing raw materials, finished goods, and cost-effectiveness (Adeniji, 2008). Proper inventory management is paramount for manufacturing companies.

Materials Requirement Planning (MRP): MRP is essential for ensuring materials are available for production and timely delivery (Heizer et al., 2017). It estimates material requirements before production starts, aiding in maintaining low inventory levels while meeting contractual obligations. Just-In-Time (JIT) is another approach that reduces inventory levels, eliminating waste and holding costs. Effective use of MRP and JIT techniques can enhance inventory management, reduce costs, improve efficiency, and enhance customer satisfaction.

Demand Planning and Forecasting: Demand planning and forecasting are crucial components of supply chain and business decision-making (Ingle, 2021). These practices involve forecasting future product demand using quantitative and qualitative methods (Reid & Sanders, 2013). Accurate demand planning is essential for inventory, production, labor, and location decisions. Quantitative methods are used when stable historical data is available, while qualitative methods are employed in unstable situations. Accurate forecasting plays a pivotal role in strategic decision-making.

2.2 Supply Chain Performance

Supply chain performance is a critical factor in today's business environment. It focuses on delivering the right goods to the right location at the right time with the least logistical cost, all while meeting customer demands for product quality, on-time delivery, and inventory levels (Hausman, 2004). It's a multifaceted concept, and researchers have identified various indicators for evaluating supply chain performance. These indicators help measure the efficiency and effectiveness of supply chain processes and are critical for enhancing supply chain operations and customer satisfaction. The supply chain is commonly understood as the connection between various business units (Mangweza &Mwanza, 2022)

Literature identifies several supply chain performance indicators as discussed below

Product Quality: Ensuring that products meet or exceed quality standards is a vital indicator in the supply chain (VanDerVorst, 2005; Najmi & Makui, 2012). Quality can be a competitive advantage when aligned with customer preferences (Cruz, 2015).
Delivery Lead Time: Measuring the time between placing an order and receiving the delivery is crucial (Hausman, 2002; Carvalho & Azevedo, 2012). Quick and on-time deliveries are essential in today's fast-paced business environment (Reid & Sanders, 2013).
Customer Satisfaction: The degree to which a customer perceives that their needs have been effectively met plays a central role in supply chain performance (Gunasekaran et al., 2001). High customer satisfaction can lead to increased loyalty and improved reputation.
Order Lead Time: Measuring the total time from receiving an order to delivering the finished items to the customer is critical (Bhagwat & Sharma, 2007). This indicator is pivotal in shaping the customer experience.
Product Availability: Having a wide range of products and no stockouts is essential (VanDerVorst, 2005; Avlijas et al., 2021). As competition is based on product availability, it's essential for businesses to strive to enhance this indicator.
Customer Query Time: This Indicator measures the time it takes to respond to customer queries is important for maintaining excellent customer service (Hausman, 2002). Timely and accurate responses can foster customer loyalty and satisfaction.
Supply Chain Cost: Evaluating the overall distribution cost and adopting cost reduction strategies is crucial (Lukinskiy et al., 2014). It's important to balance cost reduction with customer satisfaction and quality.
Supply Chain Flexibility: The ability to adapt to changes in customer demand or market conditions is critical (SCOR, 2006). As the business environment becomes more dynamic, organizations must increase supply chain flexibility.
Supply Chain Responsiveness: Responsiveness refers to the supply chain's ability to react quickly to issues and queries (Richey et al., 2021). It's particularly important in today's fast-paced environment.
Supply Chain Reliability: This indicator assesses the consistency of a supply chain's performance (Terenina et al., 2020). Reliability impacts the completeness and quality of services and products provided.
Supply Chain Efficiency: Efficiency involves reducing logistical costs while increasing revenues (Bourlakis et al., 2014). Balancing cost reduction with maintaining service levels is a key challenge.
Supply Chain Sustainability: Sustainability focuses on balancing economic, social, and environmental concerns across all stages of production and distribution (Tripathi & Gupta, 2019). It involves reducing negative environmental impacts and benefiting local communities.
Supply Chain Competitiveness: This Indicator focuses on delivering value to customers and gaining a competitive advantage (Mukhtar, 2015). Supply chain competitiveness requires a holistic approach that involves collaboration with suppliers and a focus on customer service.

2.3 Conceptual Framework Development

The development of the conceptual framework is pivotal to this study as it explains how production planning practices impact supply chain performance indicators. Drawing from the work of Jabareen (2009), we weave a network of interconnected concepts to provide a comprehensive understanding of the processes at play.

In building the conceptual framework, Key production planning practices that researchers have found to influence supply chain performance indicators where identified. These practices become our key concepts, and we explore their interrelationships within the supply chain context, guided by the three foundational theories mentioned earlier.

For instance, Sucahyo (2022) has established that production capacity planning directly impacts demand, while Adegbuyi and Asapo (2010) have demonstrated its effect on delivery schedules. Nugraha et al. (2020) has highlighted the positive impact of aggregate planning on customer relationships. These findings guide the development of the conceptual framework, providing a comprehensive understanding of how optimizing production planning practices can enhance supply chain performance.

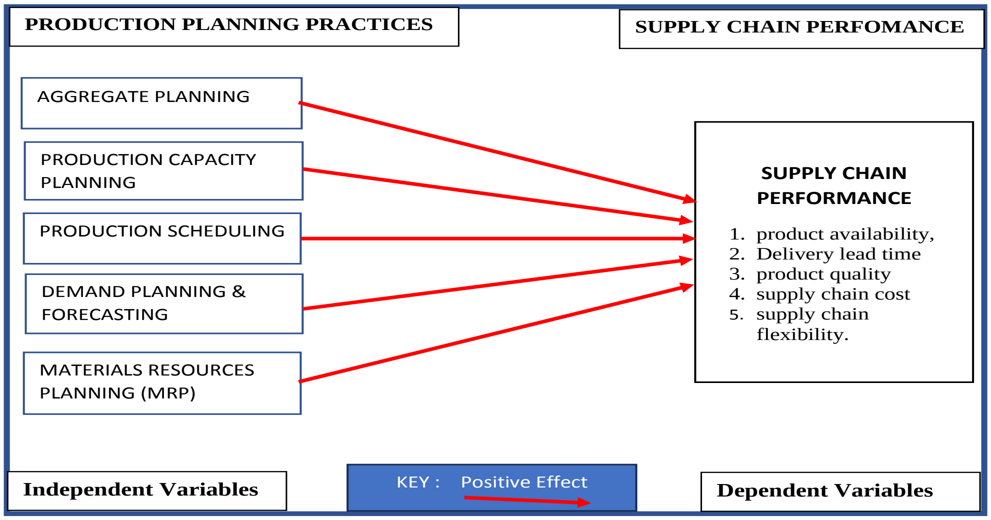

Figure 1: Conceptual Framwork (Source, Author, 2023)

2.4 Research Hypotheses

In this research, two hypotheses to determine the relationship between production planning practices and supply chain performance have been formulated

1. **H0:** There is no significant Positive effect of production planning practices on supply chain performance.
2. **H1:** There is a significant positive effect of production planning practices on supply chain performance.

We also created specific hypotheses to delve into the impact of individual production planning practices on supply chain performance.

Table 1 : Specific Hypotheses

No	Specific Hypotheses
1	H0: Aggregate Planning has no significant positive effect on supply chain performance at Corteva agriscience. H1: Aggregate planning has a significant positive effect on supply chain performance at Corteva agriscience.
2	H0: Production Capacity Planning has no significant positive effect of supply chain performance Corteva agriscience. H1. Production Capacity Planning has a significant positive effect on supply chain performance at Corteva agriscience.
3	H0: Materials resources planning (MRP) has no significant positive effect on supply chain performance at Corteva agriscience. H1: Materials resources planning (MRP) has a significant positive effect on supply chain performance at Corteva agriscience.
4	H0: Demand Planning & Forecasting has no significant positive effect on supply Chain performance at corteva agriscience. H1: Demand Planning & Forecasting Has a significant effect positive on supply Chain performance at corteva agriscience
5	H0 Production Scheduling Has no significant positive effect on supply Chain performance at corteva agriscience H1: Production Scheduling Has a significant positive effect on supply Chain performance at corteva agriscience

III. METHODOLOGY

This Study employs a quantitative approach to assess the effect of production planning practices at Corteva agriscience Zambia. The target population encompassed 70 employees at Corteva agriscience involved in production and supply chain processes. The sample size, calculated using Yamane's formula, was determined to be 60 respondents. This sample size was selected to ensure the accuracy and reliability of our study. Simple random sampling was employed to select participants from the broader population of employees engaged in production and supply chain activities at Corteva Agriscience. A structured questionnaire with closed-ended questions was administered to gather standardized responses

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concerning production planning practices and their impact on supply chain performance. Quantitative data analysis techniques were applied, involving statistical methods such as descriptive statistics and Multiple linear analysis. These analyses scrutinized the relationships between production planning practices and supply chain performance indicators, executed with SPSS and Microsoft Excel. Reliability testing ensured the consistency and stability of data collection instruments, this was evident with Cronbach's alpha's values all above 0.9implying that the measurements of independent and dependents variable are reliable under this study.

IV. RELIABILITY AND VALIDITY

Reliability testing is a statistical technique that measures the consistency of data collected from multiple sources. The aim of reliability testing is to ensure that the data collected is reliable and can be used to make valid inferences. In this study, reliability testing was conducted by using a pilot study to test the consistency and reliability of the data collection instruments document analysis tools.

V. ETHICAL CONSIDERATIONS

The study followed ethical guidelines to protect participants' rights and well-being. Informed consent was obtained, ensuring confidentiality and anonymity of data. The collected data was used solely for research purposes and not shared with third parties. Participants were informed about the interview duration and questionnaire completion time. Participation was voluntary, and participants had the right to withdraw without coercion. These measures ensured a transparent and responsible research process.

VI. ANALYSIS & DISCUSSION OF THE RESULT

6.1 Response Rate & Demography's:

The study achieved a 100% response rate, with all 60 individuals in the target sample successfully responding to the questionnaires. This perfect response rate signifies complete participant engagement and cooperation, reducing the risk of non-response bias and enhancing the validity and representativeness of the collected data, which, in turn, ensures the reliability of the study's findings. The demographic characteristics section provides further context with the participants' job titles and length of service. Among the participants, 23.33% have served for 3 years or less, 31.33% for 4 to 7 years, 30% for 7 to 10 years, and 15% for 10 years or more. This distribution highlights that the majority of participants are evenly distributed between the 4 to 7 years and 7 to 10 years categories, accounting for over 60% of the total sample. This suggests a relatively balanced distribution of experience levels within the organization, which is a critical factor to consider when evaluating how tenure may influence the study's various aspects, providing insights into the organizational dynamics and its employees. Regarding current job positions, senior management comprises 2 individuals (4% of the sample), supervisor/team leader roles encompass 17 respondents (28%), technician/specialist positions make up the most substantial group with 24 individuals (40%), and other employees consist of 17 individuals (28%). This distribution highlights a substantial presence of technicians/specialists, a significant proportion of supervisor/team leaders, and a smaller segment of senior management, reflecting a corporate structure with varying levels of responsibility and expertise among the participants.

6.2 Production Planning Practices used by Corteva

The study evaluated several production planning practices at Corteva Agriscience, assessing participants' levels of agreement with their effectiveness and implementation. The practices were rated on a scale with categories: strongly disagree (SD), disagree (D), neutral (N), agree (A), and strongly agree (SA), and descriptive statistics were calculated, including the mean (ME) rating and standard deviation (S.DEV) for each practice.

Capacity Planning received a mean rating of 3.9 and a standard deviation of 1.15702, indicating a moderate level of agreement among participants. Aggregate Planning was rated more favorably, with a mean of 4.2 and a standard deviation of 1.09686. The highest mean rating was observed for Production Scheduling, which achieved a mean of 4.6 and the lowest standard deviation of 0.49403, indicating strong consensus and high regard for this practice among participants. Inventory & Material Resource Planning also scored well, with a mean rating of 4.2 and a standard deviation of 1.09686, showing a high level of agreement regarding its use. Lastly, Demand Planning and Forecasting had a mean rating of 3.5 and a standard deviation of 1.30795, reflecting more variability in participants' responses.

These statistics provide insights into the participants' perspectives on the utilization of production planning practices at Corteva Agriscience, with Production Scheduling identified as the most utilized and valued practice. Overall, it is clear that all these production planning practices are actively used at Corteva Agriscience

Table 2: Descriptive Statistics for the Production planning Practices Used at Corteva Agriscience

	N	ME	S.DEV
Capacity Planning practices is used at corteva agriscience	60	3.9	1.15702
Aggregate Planning practice is used at Corteva agriscience	60	4.2	1.09686
Production scheduling practice is used at Corteva agriscience	60	4.6	.49403
Inventory & Material resource Planning is used to measure supply chain performance	60	4.2	1.09686
Demand Planning and Forecasting practice is used at Corteva agriscience	60	3.5	1.30795
Valid N (listwise)	60		

6.3 Production Planning Practices that Corteva Agriscience uses to Measure its SCM Performance

The objective of this section is to establish the production planning practices used to measure supply chain performance at Corteva Agriscience, and to assess their alignment with literature on supply chain performance measurement.

Capacity Planning emerges as a significant practice, with an ME of 3.85 and strong agreement from 41% of participants. This finding underscores the role of Capacity Planning in evaluating supply chain performance, aligning with literature emphasizing its importance in meeting production plans and market demand (Sucahyo, 2022).

Aggregate Planning also garners notable affirmation, with an ME of 4.08, indicating strong agreement from 53% of participants. This alignment with the literature's emphasis on aggregate planning for minimizing costs and optimizing resource utilization confirms its usage for supply chain performance measurement.

Production Scheduling achieves unanimous consensus, with an ME of 4.50, indicating its role in measuring supply chain performance. This unanimous agreement resonates with literature highlighting scheduling's critical role in ensuring efficient production processes.

Inventory & Materials Resource Planning (MRP) practices receive unanimous agreement, reflected in the ME of 4.23. This finding suggests that Corteva utilizes Inventory Management for supply chain performance measurement, consistent with literature recognizing its integral role in production planning and business success.

Demand Planning and Forecasting practices also show alignment, with an ME of 4.1 and strong agreement from 33% of participants. This suggests that Corteva recognizes the importance of Demand Planning and Forecasting as essential components of supply chain performance measurement, consistent with literature emphasizing their critical role in decision-making and supply chain performance improvement.

These findings provide valuable insights into the production planning practices employed by Corteva Agriscience to measure supply chain performance, underscoring their alignment with established literature on supply chain performance measurement.

6.4 The Effect of Critical Production Planning Practices on Supply Chain Performance

The regression analysis conducted to evaluate the impact of critical production planning practices on supply chain performance revealed significant insights. All coefficients in the model, including those for Aggregate Planning, Capacity Planning, Production Scheduling, Inventory & Materials Resources Planning, and Demand and Forecasting, demonstrated statistical significance at the 0.05 level. These findings are in line with expectations from the literature, which underscores the pivotal role of various production planning practices in shaping supply chain performance.

Specifically, the statistically significant coefficient for Inventory & Materials Resources Planning (Beta = 0.519, p = 0.001) resonates with existing research emphasizing the crucial importance of effective inventory management in ensuring timely delivery and enhancing customer satisfaction (Vincent et al., 2018). Similarly, the significant coefficients for Aggregate Planning, Capacity Planning, Production Scheduling, and Demand and Forecasting validate prior studies that have highlighted

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their substantial impact on operational efficiency, cost reduction, and customer service (Sucahyo, 2022; Noegraheni & Nuradli, 2016; Plinere & Aleksejeva, 2019; Reid & Sanders, 2013).

These results underscore the necessity of aligning production planning practices with industry best practices and organizational objectives to drive continuous improvement in supply chain performance. By integrating insights from empirical research and practical experiences, companies can refine their production planning strategies, optimize resource allocation, and enhance their competitive positioning within their respective industries.

The results of the hypothesis testing as provided in the table 5 below provide valuable insights into the critical role of production planning practices and their impact on supply chain performance at Corteva Agriscience. Aligning these findings with existing literature offers a comprehensive understanding of their significance and relevance within the broader context of supply chain management practices.

6.4.1 Multiple Regression Analysis

In the multiple linear regression analysis conducted at a 95% confidence interval to investigate the hypothesis, the model exhibits favorable fit statistics, including an F-statistic of 10.075 with $p < 0.001$, an adjusted R-squared (Adj R^2) of 0.435, and an R-squared (R^2) of 0.483. These statistics collectively suggest that the model effectively captures variance in the dependent variable, which is the "SCP indicators."

The model summary in table 3. offers essential information, with the R-squared value (0.483) representing the proportion of variance explained by the model, while the adjusted R-squared (0.435) considers the model's complexity. The F-statistic (10.075) tests the overall significance of the model, with a p-value below 0.001 indicating statistical significance. Additionally, the change statistics show how the inclusion of predictors influences the model's R-squared and F-statistic values.

Table 3: Model Summary for Production Planning practices

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.695[a]	.483	.435	.54495	.483	10.075	5	54	<.001

a. Predictors: (Constant), Average of Demand and forecasting, Average of production scheduling, Average of Aggregate planning, Average of Capacity Planning, Average of Materials Resource Planning

Table 4: Coefficients table for Production planning practices (Predictors) and Supply chain performance (Dependent)

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	1.214	.355		3.420	.001	.502	1.926
	Aggregate planning	.431	.136	.765	3.173	.002	.159	.703
	Capacity Planning	.919	.259	1.221	3.548	<.001	.400	1.438
	production scheduling	.233	.078	.386	3.002	.004	.078	.389
	Materials Resources planning	-.922	.227	-1.519	-4.065	<.001	-1.376	-.467
	Demand and forecasting	-.316	.122	-.406	-2.590	.012	-.561	-.071

a. Dependent Variable: Average of All SCP indicators

Table 5: Hypothesis testing

No	Specific Hypotheses	Statistical Significance	Decision
1	H0: Aggregate Planning has no significant positive effect on supply chain performance at Corteva agriscience. H1: Aggregate planning has a significant positve effect on supply chain performance at Corteva agriscience	Beta 0.765 T-statistic 3.173 Sig. 0.002	H1 accepted
2	H0: Production Capacity Planning has no significant Positive effect of supply chain performance Corteva agriscience. H1. Production Capacity Planning has a significant positive effect on supply chain performance at Corteva agriscience.	Beta 1.221 T-Statistic 3.548 Sig <0.001	H1 accepted
3	H0: Inventory & Materials resources planning (MRP) has no significant positive effect on supply chain performance at Corteva agriscience. H1: Inventory& Material resources planning (MRP) has a significant positive effect on supply chain performance at Corteva agriscience.	Beta .336 T-Statistic -3.065 Sign 0.001	H1 accepted
4	H0: Demand Planning & Forecasting has no significant positive effect on supply Chain performance at corteva agriscience. H1: Demand Planning & Forecasting Has a significant positive effect on supply Chain performance at corteva agriscience	Beta .716 T-Statistic 3.590 Sign 0.001	H1 accepted
5	H0 Production Scheduling Has no significant positive effect on supply Chain performance at corteva agriscience H1: Production Scheduling Has a significant positive effect on supply Chain performance at corteva agriscience	Beta 0.386 T-Statistic 3.002 Sign 0.004	H1 accepted

VII. CONCLUSION

This study undertook a comprehensive exploration of the intricate relationship between production planning practices and supply chain performance at Corteva Agriscience. While scholars globally have investigated the impact of production planning on various organizational aspects, such as profitability, organizational effectiveness, and operational efficiencies, the specific relationship between production planning practices and their outcomes within the Zambian business context has not been adequately addressed. This study aimed to investigate the effects of production planning practices on supply chain performance, using Corteva Agriscience as a case study.

Objective 1: Establish Existing Production Planning Practices at Corteva Agriscience

The first objective was to identify the production planning practices that Corteva Agriscience employs. Capacity Planning and Production Scheduling received strong agreement, resulting in mean ratings of 3.9 and 4.6, respectively. Aggregate Planning and Inventory Management each had 53% of participants agreeing or strongly agreeing, with mean ratings of 4.2. Operational Planning had mixed agreement levels, with 54% in agreement but a mean of 2.6, below the average mean of 3.0. Materials Resource Planning and Demand Planning and Forecasting exhibited moderate agreement levels, with mean ratings of 3.2 and 3.5, respectively. Focusing on practices with a mean above 3.0, the study successfully identified a diverse set of production planning practices employed by Corteva Agriscience, including Capacity Planning, Aggregate Planning, Production Scheduling, Inventory Management, and Demand Planning & Forecasting.

Objective 2: Identify Production Planning Practices Used to Measure SCM Performance at Corteva Agriscience

The second objective was to identify the production planning practices that Corteva Agriscience uses to measure its Supply Chain Management (SCM) performance. The findings highlighted the specific production planning practices that Corteva Agriscience employs as metrics for evaluating its SCM performance. The study confirmed the pivotal role of these practices in the organization’s performance evaluation framework, emphasizing their widespread adoption (with a mean above 3.0) and importance in assessing supply chain performance.

Objective 3: Evaluate the Effect of Critical Production Planning Practices on SCM Performance

The third objective was to evaluate the effect of critical production planning practices on SCM performance. Multiple linear regression analysis yielded noteworthy insights. "Aggregate Planning" significantly affects supply chain performance (Beta = 0.765, t-statistic = 3.173, p = 0.002). "Production Capacity Planning" also has a significant effect (Beta = 1.221, t-statistic = 3.548, p < 0.001). Conversely, "Materials Resources Planning" does not significantly impact supply chain performance (Beta = -1.519, t-statistic = -4.065, p < 0.001). "Demand Planning & Forecasting" does not show a significant effect (Beta = -0.406, t-statistic = -2.590, p = 0.012), and "Production Scheduling" has a significant effect (Beta = 0.386, t-statistic = 3.002, p = 0.004). These results provide insights into the specific production planning practices that significantly influence supply chain performance at Corteva Agriscience.

In summary, the study effectively identified key production planning practices at Corteva Agriscience, demonstrated their usage in measuring SCM performance, and evaluated their impact on SCM performance, providing a comprehensive understanding of their role within the organization.

RECOMMENDATIONS

To enhance supply chain performance, Corteva Agriscience should focus on strengthening production planning practices by investing in Materials Resources Planning (MRP), Capacity Planning, Aggregate Planning, and Demand Planning & Forecasting, and fostering collaborative efforts among departments. Additionally, embracing advanced technology solutions, such as integrated Enterprise Resource Planning (ERP) systems or specialized production planning software, can provide real-time visibility, automate tasks, and enable data-driven decision-making, thereby improving operational efficiency and overall supply chain performance.

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