The Effect of Manufacturing Capability on Firm Performance: Empirical Evidence from Small and Medium Manufacturing Companies in Kigali-Rwanda

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Abstract: *This research paper examined the effect of the attributes of manufacturing capability on the performance of small and medium manufacturing companies in Kigali-Rwanda. Data were collected from a final sample of 111 small and medium-sized manufacturing firms. To analyze the collected data, a two-step approach to Covariance-Based Structural Equation Modelling (CB-SEM) was applied using the Analysis of Moment Structures (AMOS) statistic software version 25.00. Data were inspected for the presence of outliers, multivariate normality, and multi-collinearity, while the reliability of the construct was assessed by Cronbach's Alpha, convergent and discriminant validity. The findings revealed that all the attributes of manufacturing capability namely quality, cost efficiency, delivery, and flexibility have a positive and significant effect on the performance of small and medium manufacturing firms. It has been concluded that manufacturing capability contributed positively and significantly to inter-firm performance validating than the resource-based view applicability to SMEs. This study contributed to the existing strategic management literature on how manufacturing capability can enhance firm performance. Therefore, the study recommended that a firm should develop a complete approach of implementing the four dimensions as they should not be considered in isolation rather integrated and combined to leverage and sustain the performance over time.*

Keywords: Manufacturing Capability, Performance, Rwanda, Manufacturing sector

Introduction

The pending issue that most strategic management scholars struggle with is “Why some firms succeed in environments that others fail?”. Two influential paradigms (Barreto, 2010) seek to answer to this question: The Structure-Conducted-Performance (SCP) paradigm which focuses on external factors (industry structure); and the resource-based view (RBV), which focuses on internal factors (resources and capabilities of firms).

By the effects of globalization of markets, competition has become more complicated and challenging, forcing firms to develop improved business models to gain and sustain competitive advantage. The manufacturing sector across the world has grown steadily and profitably during the recent years and the management has been involved in its ups and downs for a decade. The ambition of growth is still strong and looking for performance heterogeneity only outside the firm seems -to the researcher’s best knowledge- aberrant. The raise of the resource-based view has brought insightful success as the SCP, even if still largely applied (Leonidas *et al.*, 2017; Wu and Yang, 2014) has shown its limits because it neither pays attention to the firm itself nor the capabilities of the management. As a result, the framework's application on the contexts outlined in the global competition of today is insufficient.

The necessity of locating performance differentials internally to the firms using resources and capabilities is nowadays widely acknowledged by most strategy scholars. However, albeit the resource-based view provides a useful framework for explaining the heterogeneity of firm performance based on capabilities, its framework was designed to fit larger enterprises. It is not clear whether this theory which was developed for larger enterprises should also be of great importance to small and medium-sized companies. Within this context, Trott *et al.*, (2009) called for more works to validate the applicability of this theory to small to medium-size enterprises (SMEs).

While the importance of manufacturing capability is acknowledged in improving firm performance within the resource-based view, the prominence of small and medium enterprises (SMEs) for economic and social development is also universally documented since they play a vital role in economic growth and job creation (Lave and Roper, 2013). For instance, in Rwanda SMEs comprising 99% of total businesses contribute to the Gross domestic product (GDP) at 50% and make 37% of total employment (National Institute of Statistics of Rwanda, 2018).

With an average 8% annual growth rate for the past two decades, Rwanda has been one of the fastest-growing economies in Sub-Saharan Africa (SSA), backed by a strong policy framework (Calabresse *et al.,* 2017). However, despite positive developments, the Rwandan economy remains relatively uncompetitive on several indicators. Ninety-nine percent of firms are SMEs (NISR, 2018) with only 24% of chance of surviving (NISR, 2018b). More specially, compared with agriculture and services, the Rwandan manufacturing sector has struggled to gain a strong place in the country's economy. For the most recent, manufacturing value-added in GDP has remained stagnant, at around 5%, according to the World Bank (2018). Manufacturing provides a small contribution with only 15% of total merchandise exports in 2015 (for Uganda and Tanzania this figure is much higher, at around 25%, according to the World Bank (2018). This is exacerbated by -to the researcher's best knowledge- limited capabilities and especially manufacturing capability forcing companies to perform poorly.

Therefore, this study examined the effect of the dimensions of manufacturing capability on firm performance based on the RBV perspective; more specifically, to determine the impact of quality, low cost, flexibility and delivery capabilities on firm performance in the Rwandan manufacturing sector.

Literature Review

The RBV is a strategic management theory which claims that companies compete on the basis of "unique" organizational resources and capabilities that are valuable (in the sense that they exploit opportunities and neutralize threats in a firm's environment), rare (among a firm's current and potential competition), difficult to imitate, and non-substitutable by other resources (Barney *et al.*, 2011). Barney *et al.*, (2011) claim that these attributes of a company's resource signify an indicator of how heterogeneous and immobile a firm's resources are and, thus, how useful these resources are for generating sustained competitive advantage. The RBV treats capabilities as unique path-dependent processes difficult to imitate by competitors (Amit and Schoemaker, 1993). Therefore, the RBV has been considered as one of the most conspicuous and influential theories to explain organizational behaviour (Barney *et al.*, 2011) and firm performance (Leiblein 2003) based on capabilities.

Capabilities abound within the resource-based view but Jiang, (2014) and Wilden and Gudergan (2015) distinguish between managerial, manufacturing and marketing capabilities as they are considered the most important functional attributes of a manufacturing firm to maintain daily operations, generate technical fitness and consequently earn a competitive advantage for the firm.

Capability and Manufacturing Capability

Broadly, capability refers to a firm's ability to efficiently exploit its resources, to manufacture products or develop services to achieve business objectives (Amit and Shoemaker, 1993; Kumar *et al.,* 2010). Capability is a subset of an organization's resources, defined as tangible and intangible assets, that enable the organization to take full advantage of other resources it controls (Barney and Hesterly, 2012). Pearce and Robinson (2011) defined capabilities as skills or ability and way of combining assets, people and processes that an organization uses to transform inputs into outputs. For the foregoing, because manufacturing is the basic purpose of all manufacturing firms (being it small or large) share together when discussing manufacturing SMEs, the focus should be on the manufacturing capability.

On the other hand, being a useful amplification of general capability, manufacturing capability is according to Gao and Tian (2014) the most basic part of the original capability and the core operational capability in manufacturing enterprise since it provides organizations with certain competitive power and used as a competitive weapon to achieve manufacturing performance in cost containment, quality and time dimension. According to Terjesen *et al.*, (2011) manufacturing capability refers to the ability to maintain simultaneously a high level of balanced performance in productivity, quality, delivery, cost, and flexibility. As such, this capability is embodied by all available manufacturing resources and corresponding processes which can be performed by those Sarjana (2015).

However, there appears to be a consensus in manufacturing literature that manufacturing capabilities are manifested in four dimensions: quality, cost, delivery and flexibility (Jacobs *et al.,* 2007; Krause *et al.,* 2001; Mukerji, *et al.,* 2013; Rosenzweig *et al.,* 2003; Swink *et al.,* 2007;) to which some authors like Kumar *et al.,* (2010) and Schroder *et al.,* (2011) add innovation that has not been considered in this study because according to Kasema (2019a) is one of the core components of Dynamic capability. The fact that different scholars have connected the concept of manufacturing capability to unequivocally measurable variables is a very significant step for further analysis. Without this possibility to overtly express how manufacturing capability is observed in practice, this concept could not be observed with reliability and validity.

Therefore, this study conceptualizes manufacturing capability as the process of combining quality, flexibility in producing and delivering goods on time at a cost that enables the firm to gain and sustain competitive advantage. This conceptualization encompasses the four attributes of manufacturing capability (see Figure 1) as per Mukerji *et al.,* (2013) because they have been scientifically proved to be sufficiently complete to cover all critical dimensions of the concept and are relatively easily measurable (Schorder *et al.,* 2011; Zahra et al., 2006). However, Raymond *et* *al.*, (2010) opined that rarely even the most successful companies excel all the dimensions with the same propensity, i.e. some maybe with high propensity than others.

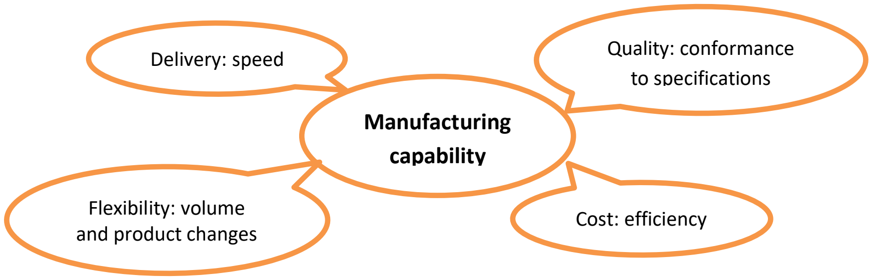

Figure 1. Conceptualising Manufacturing Capability

The figure above illustrates the consensus among scholars of what manufacturing capability means. These four dimensions are a simple but inclusive approach of breaking down what shapes excellent manufacturing capability.

Quality is the degree to which products meet manufacturing specifications (Lau Antonio *et al.*, 2007; Slack *et al.*, 2009). Quality can be defined as fitness for use and includes product performance, reliability, and durability (Tracey *et al.*, 1999; Ward *et al.*, 1996). It includes also, according to Lau Antonio *et al.*, (2007) the degree to which the product is fit for use, the degree to which it contains the functionality, features (defective rates) and styling required by customers.
Delivery refers to the ability to provide products at the specified time (Ward *et al.*, 1998). A fundamental objective is to minimize lead time to effectively meet customer requirements reliably (Jacobs *et al.*, 2011). Delivery incorporates both the dimensions of dependability (reliability) and speed (Droge *et al.*, 2012). While dependability refers to doing things on time and the ability to deliver orders correctly on promised due dates (Lau Antonio *et al.*, 2007; Slack *et al.*, 2009) speed is the ability to deliver goods faster than competitors, which can be vital to winning orders (Ward *et al.*, 1998).

Cost capability refers to a firm's actual ability to produce products at a lower cost than its competitors. Slack *et al.*, (2009) defined cost capability as doing things cheaply, producing goods and services at a cost that enables them to be priced appropriately for the market while still allowing a return to the organization. Most of the time, cost efficiency stimulates effectiveness and builds share through the manufacturer's ability to adjust prices dynamically in response to its market and competition (Swink *et al.*, 2005).

Flexibility refers to the ability to adapt and respond to changes in production volume or mix to give customers individual treatment or to introduce new products/ services (Slack *et al.*, 2009). Lynn (2000), Dangayach and Deshmukh (2003), and Zhang *et al.*, (2003) conceptualized flexibility as a mixture of product customization, mix changes, design changes, volume changes and responsiveness to customer requirements. All these dimensions of manufacturing capability allow the flexible production of a high-quality product with high consistency, at a low cost that can be launched quickly in the market to gain an advantage.

Firm Performance

Being an important variable in business research, the concept performance is ambiguous since there is no simple agreed definition and measurement to evaluate the performance of a firm. As a multidimensional construct, performance has several names, including growth (Dobbs and Hamilton, 2007; Wolff and Pett, 2006), survival, success and competitiveness. In this study, the firm performance was conceptualized as referred to growth in sales, profitability, customer satisfaction, market share and product quality (Kasema, 2019a).

For the foregoing, it was hypothesized the following:

- *H1: Quality capability positively affects firm performance.*
- *H2: Cost efficiency positively affects firm performance.*
- *H3: Delivery capability positively affects firm performance.*
- *H4: Flexibility capability positively affects firm performance.*

Empirical Studies

In order to connect manufacturing capability to firm performance, the empirical literature has been reviewed to assess how reliable and valid the perception of capability is. Indeed, from the extant literature review, the manufacturing capability has been posited as an important contributor to firm performance (Peng *et al.*, 2008; Terjesen *et al.*, 2011). Let some being examined and summarized as follows:

An empirical research study by Mukerji *et al.*, (2013) of 238 Canadian manufacturing companies, using the Maximum likelihood estimate (MLE) technique, revealed that only cost is positively correlated with performance whereas flexibility is negatively correlated with commercialization performance. The results suggested further that the ability to lower manufacturing cost without paying due attention to other dimensions of manufacturing capability; such as quality and manufacturing flexibility, leads to an unsatisfactory commercialization performance. Despite the fact of using the RBV with a strong sample size, the study, however, was conducted in a developed country. Therefore, the limited focus to developed countries poses a serious problem to the completeness of this theory and is a major gap in the literature since there are many dissimilarities between firms in developed and developing countries.

A study by Selcuk and Talha (2006) investigated the effects of a firm’s manufacturing capability choices on business performance. A proposed model was developed based on the manufacturing literature. To test the proposed model, a survey instrument was developed and conducted to 200 firms in Ankara and Istambul/ Pakistan. within a survey design, confirmatory factor analysis was applied to evaluate the survey instrument. Study results supported the proposed structural equation modelling. According to the analysis’ results cost and quality positively affect a firm’s business performance. Even if the study findings revealed a positive a significant effect of manufacturing capabilities on firm performance, it is, however, believed that generalizability of these results can be enhanced by examining the capabilities which have been identified from a variety of larger firms operating in different industries from small and medium-sized firms’ perspective.

METHODS

Research Philosophy and Design

This research adopted a positivist philosophy that accords with survey research design in a deductive approach. The following table summarizes the entire methodology used in this study such as philosophy, design, approach, method and data collection method.

Table 1. Research philosophy, approach, and method of this study

Domain	Position
Research Philosophy	Positivism
Research Design	Descripto-Causal
Research Approach	Deductive
Research Method	Quantitative
Time Horizon	Cross-Sectional
Data Collection Method	Survey Questionnaire

Population, Sampling Method and Sample Size

The Rwandan manufacturing sector currently consists of 14.054 companies of which 868 small and medium companies (Micro manufacturing companies are excluded). Kigali city, the research area, counts 397 small and medium companies (NISR, 2018) formally registered with the Rwanda Revenue Authority (RRA) which constitute the population of this study. Using a stratified sampling technique, the sample has been selected using Sloven's formula **n:**$\frac{N}{1+N(e2)}$ and the sample was 154 participants.

The key respondents for the study were production managers/directors or Chief operations officers from manufacturing firms that have extensive experience, in this case, firms that have been working for at least four years. This because those that have not been in business for that long are considered new or nascent SMEs (Fatoki and Garwe, 2010). This study used a personal interview-based survey method with a drop and collect approach for executing the survey. Both pre-testing and piloting were done before the final survey to assess the wording and psychometric analysis (reliability and validity) Saunders *et al.,* 2007).

Measurement of Variables and Instrumentation

The study measured manufacturing capability -the independent variable- using four metrics: quality, cost, flexibility and delivery with every four items adapted from previous studies and adapted to fit the Rwandan context. More importantly, manufacturing capability items were borrowed from Selcuk and Talha (2006), Swink *et al.,* (2007) and Terjesen *et al.,* (2011). In measuring firm performance, subjective (self-reported) measures by production managers were used which are consistent with earlier studies such as Chari and David (2012), Kasema (2019a), and Nath *et al.,* (2010).

The firm performance consisted of six questions related to sales growth, profit growth, market share growth, customer satisfaction, and quality product. The respondents were asked to give their responses based on a five-point Likert-type scale with 1= strongly disagree; 2= disagree, 3= Neutral, 4= agree; 5= strongly agree. A survey questionnaire with a cover letter explaining the main purpose of the study and assuring confidentiality was sent to 154 firms selected to participate and provide information for the research. However, only 111 questionnaires were returned; making a response rate of 72%.

A pilot study was conducted to detect the psychometric properties of the measures in the survey instrument. Piloting serves to conduct the reliability test for internal consistency of the instrument using Cronbach's alpha for which the results are reported hereunder:

Table 2. Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.971	.968	22

Source: SPSS results, 2019

The results showed Alpha values greater than the cut-off of 0.7 (Hair et al., 2010; Hair *et al.*, 2017b) indicating adequate reliability with Cronbach's alpha values of 0.971 considered excellent for the final survey.

Data Analysis Procedures

Collected data were analyzed using both IBM-SPSS version 25 and IBM-AMOS (Analysis of Moment Structures) for the Structural Equation Modelling (SEM). The preliminary analysis like the detection and treatment of missing data, normality assumptions and exploratory factor analysis (EFA) was conducted with SPSS. The two-step covariance-based structural model (CB-SEM) i.e. measurement model and structural model for SEM was tested using AMOS.

The measurement model was assessed by a series of the goodness of fit indices such as GFI, RMSEA, TLI and CFI and reliability and validity including convergent and discriminant validity. The structural model was assessed using the same goodness of fit indices as per measurement model and the path estimates and critical ratio (CR). So, according to Hox and Bechger (2012) any relationship which will result in a critical ratio (C.R or t-values) greater than 1.96 is considered significant.

Findings and Discussions

Findings

Test of Normality: Normality was tested using the value of skewness and kurtosis. In this stage, the skewness and kurtosis value of all variables were identified and showed that all variables i.e. both independent and dependent variables had a value between -2 and +2. Thus, all variables in this study have a normal distribution.

Test of multi-collinearity: testing multi-collinearity was done by using the Variance Inflation Factor (VIF). If the Variance Inflation Factor (VIF) value lies between 1-10, then no multi-collinearity (Hair *et al.*, 2009). The results of the VIF values (1.00) indicated that all variables in the model were consistently within this value (Max VIF=10.00), which indicates that multicollinearity is not a concern in this research (O'Brien, 2007; Sekaran, 2000).

Test of Reliability: testing for reliability was done using Cronbach's alpha formula. The closer the reliability coefficient to 1.0 is the better. In this study, the Cronbach's alpha value obtained is 0.889, greater than 0.7 the generally accepted lower limit of alpha values (Hair *et al.*, 2010).

Unidimensionality test: exploratory factor analysis (EFA) was conducted on the initial set of items to ensure the unidimensionality of the measurement model. Unidimensionality is based on the traditional common factor model in which sets of items share only a single underlying factor (Gerbing and Anderson, 1998). Indeed, the appropriateness of factor analysis should be determined with the KMO (Kasier-Meyer-Olkin) measure of sampling adequacy (Norusis, 1993). In this study, KMO was found to be 0.855, with a significant result (0.000) i.e. $p<0.001$ of Bartlett's test (see Appendix 3) indicating that all chosen variables were correlated adequately for EFA and acceptable for further analysis (Pallant, 2013).

The Principal components analysis and Varimax rotation method were used as a factor extraction method. Kaiser's criterion of Eigenvalues greater than one and scree plot were applied for factor's extraction. As can be seen from Table Appendix 4, the five factors with Eigenvalues greater than one account for 57.155% of the total variance. According to the rule of principal component analysis, only factors that have Eigenvalues greater than one should be retained and this was the case for this study. In the same vein, the results revealed that the first factor has an Eigenvalues of 6.968 and a percentage of the variance of 31.672%. This factor explained 31.672% of the total variance and the other four factors explained the remaining variance in the model.

Profile of Respondents

The surveyed manufacturing companies are young (with less than 10 years old) 67%; are almost evenly spread across the three districts that form Kigali city; mostly owned by adults (people aged between 40-59 years old) 63%; men (66%) towards food, beverage, and tobacco sub-sector (33%).

Structural Equation Modelling (SEM) Findings

To perform SEM a two-step approach was used. The measurement and structural models were performed sequentially (Fynes *et al.*, 2005). In the first step, confirmatory factor analysis (CFA) was used to evaluate the purified measurement model. Confirmatory factor analysis tests the measurement scale developed according to the results of exploratory factor analysis. The pictorial measurement model results are presented in Figure 2.

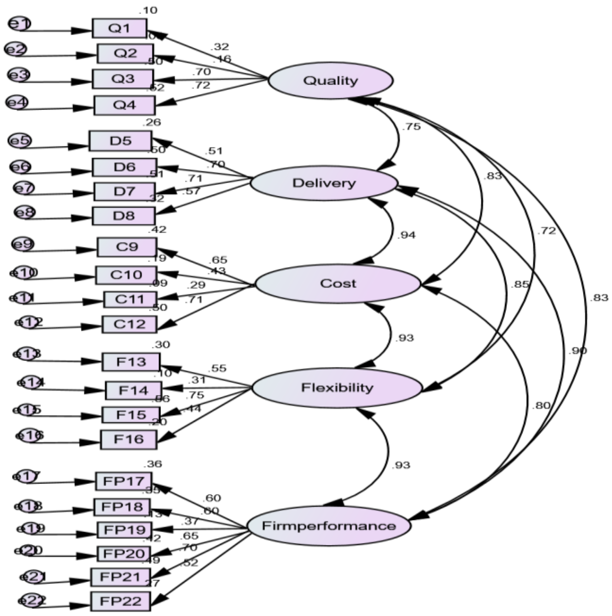

Figure 2. CAF Results for the Measurement Model
Source: AMOS Output, 2019.

The CFA affords a stricter interpretation of unidimensionality than can be provided by EFA (Garbing and Anderson, 1988). The fit of the purified measurement model was tested using AMOS 25 and the Composite Reliability (CR) and Average Variance Extracted were first tested followed by fit indices such as Absolute fit indices (AFI) and Incremental fit indices (IFI) for which results are reported in Table 3. To recall, CR indicates the consistency of the constructs while AVE measures the amount of variance attributed to the construct relative to the amount due to measurement error (Azwa *et al.,* 2016). The rule of thumb suggests that the value of AVE should be 0.5 and above (Chin, 1988) and that of CR should be 0.6 and above (Hair *et al.*, 2014).

Table 3. Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Quality	0.714	0.812	0.662
Delivery	0.723	0.799	0.691
Cost	0.879	0.772	0.614
Flexibility	0.708	0.822	0.679
Performance	0.924	0.781	0.698

Source: Researcher's compilation based on AMOS results, 2019.

The measurement results revealed that all the five constructs have got the minimum requirements for AVE (0.662, 0.691, 0.614, 0.679 and 0.698) and CR (0.812, 0.799, 0.772, 0.822 and 0.781) respectively for quality, delivery, cost, flexibility and firm performance as reported in Table 1. When taken altogether with the values of composite reliability (which were higher than 0.6 for each construct) and AVE greater than 0.5 it can be concluded that convergent validity was established.

Table 4. Fit Indices for the Measurement Model.

Fit Index	This Research	Recommended Values	Sources
x2 (p-value)	0.056	≥0.05	Byrne (2016)
CMIN/df	2.623	≤3	Gefen et al. (2000)
GFI	0.918	≥0.9	Rehman et al. (2015)
RMSEA	0.53	≤ 0.06	Hu and Bentler 1999
TLI	0.916	0.9	Lei and Wu (2007)
CFI	0.935	0.9	Lei and Wu (2007)

Source: Researcher's compilation based on AMOS results, 2019.

Furthermore, with the χ^2 of 47.22 and df= 18; the fit indices showed that the Goodness of Fit Index (GFI) = 0,918, Tucker Lewis Index (TLI) = 0,916, Root Mean Square Residual (RMR) = 0,053) and Comparative Fit Index (CFI) = 0,935. Consequently, taken altogether, composite reliability (CR) and average variance extracted (AVE) assessment and model assessment results support the overall measurement model i.e. the theorized model fits well with the observed data.
The second step of a SEM analysis consists of assessing the fit of a structural model and validating the research hypothesis. The pictorial results of the structural model are reported in Figure 3.

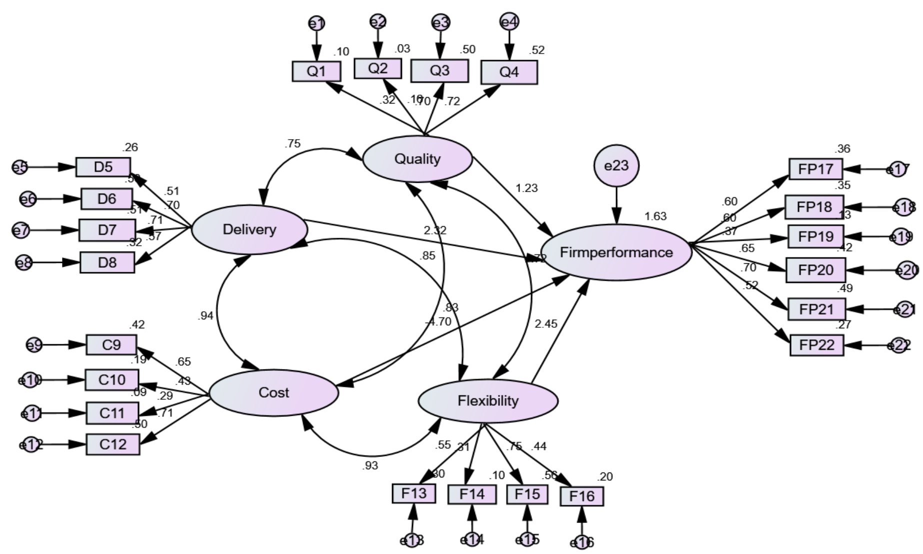

Figure 3. SEM Results for the Hypothesised Model
Source: AMOS Output, 2019.

Goodness of fit indices and parameters estimates and critical ration were used to evaluate the hypothesized structural relationships. The fit indices reported in Table 3 indicated that the hypothesized model provided a good fit to the data.

Table 5. Fit indices for the Structural Model.

Fit Index	This Research	Recommended Values	Sources
x2 (p-value)	0.052	≥0.05	Byrne (2016)
CMIN/df	1.830	≤3	Gefen *et al.*, (2000)
GFI	0.925	≥0.9	Rehman *et al.*, (2015)
RMSEA	0.517	≤ 0.06	Hu and Bentler 1999
TLI	0.968	0.9	Lei and Wu (2007)
CFI	0.956	0.9	Lei and Wu (2007)

Source: Researcher's compilation based on AMOS results, 2019.

The GFI and RMSEA were 0.925 and 0.517 respectively indicating a good fit of the model. The TLI and CFI were 0.968 and 0.956 respectively indicating a good fit of the model. Furthermore, the $\chi 2$/ df = 1.830 was within the threshold level i.e. 1.0 < x2 / df < 3.0), i.e. χ^2 of 38,44 and df= 21. However, as the fit indices alone are not sufficient to validate the theoretical model, it is therefore interesting to examine the parameter estimates and critical ratio (C.R) that reported the hypothesized relationships for which the results are reported in Table 4.

Table 6. Regression Estimates of the Latent Constructs

Paths	Standardized Regression weights (β)	C.R	P	Result
Perf <--- Quality	0.749	9.128	0.019	Supported
Perf <--- Delivery	*0.745*	*8.466*	***	Supported
Perf <--- Cost	*0.795*	*18.991*	***	Supported
Perf <--- Flexibility	0.788	*17.012*	***	Supported

Source: Researcher's compilation based on AMOS output, 2019

Using the path estimates and C.R values, four causal paths were examined in this research study and all of them were above the 1.96 critical values (18.001, 17.012, 9.128 and 8.466 respectively for cost, flexibility, quality and delivery dimensions of manufacturing capability) as recommended by Hox and Bechger (2012) at the significant level p ≤.05. Based on these results, cost efficiency capability is the most critical *(β= 0.795)* followed by flexibility capability ((*β= 0.788)* in improving firm performance.

Discussions

The main findings of this study are that most surveyed firms believed that all four dimensions of manufacturing capability positively and significantly affect a firm's performance. This was theoretically and empirically supported by previous studies. Indeed, these findings are consistent with the proposed models reported from the studies of Mukerji *et al.*, (2013), Selcuk and Talha (2006), and Terjesen *et al.*, (2011) that found a positive and significant effect of manufacturing capability on firm performance.

Theoretically, it is believed that the lower cost and high-quality capabilities will decrease demand uncertainty problems resulting from the needs of customers and lower entry barriers to the markets (John *et al.*, 2001). In the same vein, flexibility which increases product variety a new product development ability is crucial to sales increment and profit growth (Zhang *et al.*, 2003). Flexibility has also potential to directly contribute to other competitive capabilities such as delivery speed, quality and customer satisfaction. Therefore, a firm which fulfils these dimensions even if at different magnitude tend to leap their competitive advantage over competitors.

Conclusion and Recommendations

Conclusion

This research paper examined the effect of the attributes of manufacturing capability on the performance of small and medium manufacturing companies in Kigali-Rwanda. The structural equation modelling (SEM) was applied to test the hypothesized model. The Analysis of Moment Structures (AMOS) software version 25.0 was performed on data collected from a final sample of 111 small and medium firms using a survey questionnaire. Data were first inspected for the presence of outliers, multivariate normality, and multi-collinearity, while the reliability of the construct was assessed by Cronbach's Alpha, convergent and discriminant validity. The findings revealed that all the attributes of manufacturing capability namely quality, cost efficiency, delivery, and flexibility have a positive and significant effect on the performance of small and medium manufacturing firms in Kigali-Rwanda. Moreover, cost efficiency followed by flexibility was proven to play the most important role in determining a firm's performance. Therefore, based on these results, it has been concluded that manufacturing capability contributed positively and significantly to inter-firm performance validating the applicability of the resource-based view to SMEs.

Limitations of the Study

Although the findings of this study are encouraging and useful, this research study has some limitations like most field surveys have:

(i) It would be very difficult to confirm that the accuracy of these findings may not vary over time because of the nature of the cross-sectional design used in this study.

(ii) Although subjective perceptual measures, especially from top management, can be considered as accurate or considered as a substitute of objective performance measures (Fonti *et al.*, 2017; Quigley *et al.*, 2017) it is imperative to acknowledge the problems associated with the fact that the respondents' perceptions might not be impartial;

(iii) The generalization of the findings is bounded due to the geographical limits imposed by Kigali, the capital of Rwanda as the sole study site.

(iv) The size of the sample being small this limits the generalizability of the findings.

Research Recommendations

Recommendations for Managers

The study findings suggested that all four dimensions of manufacturing capability are needed to gain and sustain firm performance over time. Therefore, the study recommended that a firm should develop a complete approach of implementing the four dimensions as they should not be considered in isolation rather integrated and combined to leverage and sustain a competitive advantage. Although they cannot be considered in isolation, they have different magnitude when it comes to boosting performance. The findings showed that they are all important movers to performance differentials but with a propensity to cost and flexibility capabilities. This because it has been found in this study and supported by Swink *et al.*, (2005) and Slack *et al.*, (2009) that on one hand most of time cost efficiency stimulates effectiveness and builds share through the manufacturer's ability to adjust prices dynamically in response to its market and competition and on the other, customizing design, volume and responsiveness to customer requirement is a must if the firm wants to gain and sustain performance against its competitors over time.

Recommendations for Policymakers

The government of Rwanda should not only quicken the industrial "Skill development and labour productivity plan" to improve competitiveness as outlined in the Made in Rwanda Policy but also should continue with the approach of providing tax incentives to imported raw and packaging materials to unpack the issue of production cost one of the major drivers of performance. The government should also provide full support to manufacturing firms for product certification by the Rwanda Standard Board (RSB) to allow all manufacturing sectors to cope with the issue of quality standards one of the dimensions of the manufacturing capability.

Recommendations for Future Research

This paper has drawn some limitations which need to be overcome by future research; the study, therefore, recommended the following:

(i) The use of longitudinal data and comparisons with this study would provide further insight that would assist in generalizing knowledge on the manufacturing capability-performance nexus.

(ii) Future research should supplement the subjective measures of firm growth rate used in this study by objective (accounting) measures to capture the performance heterogeneity over time.

(iii) It will be interesting for future research to test and explore the model developed for this study at the national level and in other cultural settings. This will be valuable in providing evidence concerning the robustness of the research model across different cultural settings.

A future empirical examination should emphasize multiple informants' views (production manager, marketing manager and other employees for instance) for inter-rater validity to improve the internal validity of the measurements.

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Appendices

Appendix 1: Multi-collinearity

Coefficients[a]

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
(Constant)	.162	.110		1.477	.141		
Mafcap	.791	.049	.743	16.014	.000	1.000	1.000

a. Dependent Variable: Performance

Appendix 2: Reliability Statistics

Cronbach's Alpha	N of Items
.889	22

Appendix 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.855
Bartlett's Test of Sphericity	Approx. Chi-Square	1684.807
	df	231
	Sig.	.000

Appendix 4: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.968	31.672	31.672	6.968	31.672	31.672	3.441	15.640	15.640
2	1.817	8.261	39.933	1.817	8.261	39.933	3.070	13.955	29.595
3	1.394	6.334	46.267	1.394	6.334	46.267	2.740	12.453	42.048
4	1.323	6.012	52.280	1.323	6.012	52.280	1.489	6.767	48.815
5	1.073	4.875	57.155	1.073	4.875	57.155	1.464	6.656	55.471
6	.894	4.698	61.853						
7	.889	4.039	65.892						
8	.839	3.812	69.704						
9	.766	3.481	73.185						
10	.746	3.392	76.577						
11	.665	3.023	79.600						
12	.605	2.752	82.352						
13	.541	2.460	84.812						
14	.527	2.395	87.207						
15	.480	2.184	89.390						
16	.447	2.030	91.421						
17	.418	1.901	93.322						
18	.361	1.641	94.963						
19	.346	1.571	96.534						
20	.299	1.358	97.892						
21	.240	1.091	98.984						
22	.224	1.016	100.000						

Extraction Method: Principal Component Analysis.