THE RELEVANCE OF OPERATIONAL SKILLS TOWARDS BUSINESS SUSTAINABILITY: A FOCUS ON SMME MANUFACTURERS IN THE VAAL TRIANGLE REGION

R Naidoo: University of Johannesburg
B Urban: University of the Witwatersrand Business School

Purpose: Activities in the manufacturing sector are often considered the bedrock of an economy and a key driver of growth and development. Within the South African manufacturing sector, operations skills are reported to be deficient and are often cited as a main cause of failure in small, medium and micro enterprises (SMMEs). This study explores and tests this fragile relationship between operations skills and SMME sustainability. Empirical investigations are conducted in a high-density SMME manufacturing environment – the Vaal Triangle Region.

Design/Methodology/Approach: Building on previously established literature on SMME sustainability and operations skills, various measures are developed and tested for reliability and validity. Factor analysis is used to identify relevant factors in terms of operations skills. Co-relational analysis is then employed to test the hypothesised relationship. The study is cross-sectional in design and relies on trained fieldworkers administering surveys for data collection.

Findings: Five clear factors for operations skills are identified through factor analysis with an overall high reliability value. Based on descriptive and co-relational analysis results reveal that operations skills are positively associated with sustainability.

Implications: SMME owners, educators and service providers may benefit from the study's findings in terms of the nature and associations that operational skills have on developing sustainable SMME's.

Originality/Value: The study focused on a neglected area of SMMEs – the importance of operations towards business sustainability, and made an important contribution towards theory development through empirical explorations. In South Africa, this is the first time an instrument measuring operations skills has been validated and associated with SMMEs in a manufacturing context.

Key words: SMME, operations, skill, sustainability, manufacturing, South Africa.

INTRODUCTION

Worldwide, small medium and micro enterprises (SMMEs) are seen by policymakers as the ideal way to increase sustainable development (La Porta & Schleifer, 2008:3; Naude, 1998:134). SMMEs are pivotal to the growth and development of the South African economy (Butcher, 1999:1; Seda, 2007: 7), and inextricably linked to economic empowerment, job creation, and employment within disadvantaged communities (Davies, 2001:33; South Africa Survey, 2007).

SMMEs have a heightened relevance in emerging countries and strategies have been developed world wide to expand and integrate this sector into the mainstream of economic activities (Luiz, 2002:54). In South Africa (SA), although SMMEs are currently at the forefront of local economic development and are purported to resolve socio-economic problems (Kesper, 2001:1), this sector faces a wide spectrum of constraints, which restrict them from reaching and maintaining a competitive position in their respective industries (Cape Metropolitan Council, 2000:38). Although SMMEs may act as catalysts of activity for an entire economy (Bygrave & Minnitti, 2000:25), many of them fail. In SA up to 50% of new businesses eventually fail (Ladzani & Van Vuuren, 2002:156; South Africa Survey, 2007), although it remains difficult to assess the true nature of SMME failure due to the lack of accurate data on this phenomena. One of the reasons for such a high business mortality rate is the entrepreneur's lack of managerial skills, which eventually impairs the new business. Moreover, such a high mortality rate indicates that there is a deficit of management skills, particularly in terms of operations skills. The area of production/operations management has failed to attract the right quality of human resources (Sohal, D'Netto, Fitzpatrick & Noori, 2001: 438), and the need for training in operations management is reportedly the most significant area of training required by South African SMMEs (Perk & Smith, 2008: 156). Moreover, SMMEs do not have the full range of skills and expertise to operate their production/operations systems efficiently, with a

third of SMMEs recognising that their competitiveness has suffered as a result of skill shortages (Mclarty, 2000: 618).

Not only is it essential for SMMEs to develop skills in all management functional areas, but the critical functional area of operations (Ibrahim & Soufani, 2002:424), is often neglected, even though operations are at the heart of many organisations (Gaither & Frazier, 1999:6; Pycraft, Singh et al, 2003:4). An entrepreneur's technical and operations competencies are an important form of expert power that facilitates the implementation of the business vision and strategy (Dorf & Byers, 2008:73). Technical and industry-specific competencies are often ignored in SMME settings, even though these are pivotal due to their direct affect on business sustainability. Technical skills are requisite for start-ups and operations skills are often acquired only through experiential learning (Perks & Struwig, 2005:179). Not only do industry-specific skills and relevant operations skills directly affect performance, but when combined with entrepreneurial skills may together serve as a source of competitive advantage that rivals find difficult to identify and imitate (Barreira, 2004).

Efficient business operations (this term is used inclusively to denote the production and operations management function for purposes of this study) represents a major opportunity for SMMEs to improve their productivity and profitability as well as to reduce costs and enhance customer service (Heizer & Render, 2004:3).. Recognising the importance of skills and competencies as critical success factors driving SMMEs (Bukula, 1995:7), the South African Government has initiated the provision of accessible and appropriate skills training for SMMEs. One such initiative is the South African Skills Development Act, No 97 of 1998 that acknowledges the need to increase the skills levels of individuals, by promoting self-employment and training (Clover & Darroch, 2005: 239; Barreira, 2004:15).

The manufacturing sector in SA (SA) is one of the largest contributors to the country's gross domestic product (GDP), and has the greatest potential to generate employment opportunities and enhance national economic growth (Davies, 2001:34). This sector contributes approximately 35% towards the country's GDP and employs approximately 18% of SA's workforce (Econometrix, 2002:41). Moreover, the manufacturing sector is the dominant economic sector in the Vaal Triangle Region (VTR), which has undergone a significant restructuring process, with considerable job losses in the past years. To counteract these losses there has been a call for low technology SMMEs to be established and made sustainable in order to create jobs. This industrial regeneration initiative is of critical importance for this region (Slabbert & Dorfling, 2001:42).

The worldwide phenomenon, where local governments are assuming a more important developmental role in supporting SMMEs (Yanta, 2001:46), is manifested in the Gauteng Provincial Government (GPG) initiative with the creation of the Gauteng Manufacturing Advisory Centre (GAUMAC), which has the purpose of stimulating SMME development in the manufacturing sector (Slabbert & Dorfling, 2001:3).

The paper proceeds as follows: first, the literature is reviewed to identify operations skills that have been linked to business sustainability. Secondly, the various skills are operationalised and subject to factor analysis to provide a valid and reliable instrument with which to measure these constructs. Following these investigations, associations between operations skills and SMME sustainability are statistically tested. The paper ends by drawing policy and practical implications along with conclusions based on the empirical evidence.

GLOBAL AND LOCAL SMME ACTIVITY

Companies across the globe are becoming more focused on their core competencies and, as a result, are unbundling their business operations, specifically those that do not contribute to these core competencies (Dorf & Byers, 2008:77). Unfortunately, one of the primary outcomes of the unbundling process is the reduction of the corporate sector workforce (Cape Metropolitan Council, 2000:10). International trends, such as downsizing, outsourcing, privatisation, restructuring, and reengineering of business processes, are more readily adopted as survival techniques to assist firms to improve productivity and remain operational for as long as possible (Franz, 2000:12; Sohal et al, 2000:439).

Correspondingly, over the past few years, there has been a general downscaling of major industries in the VTR, with an attendant high level of retrenchments. In particular, the chemical and steel industrial

sectors in this region have been seriously impacted by restructuring and globalisation threats (Slabbert & Dorfling, 2001:44).

To counteract such global and local tendencies, policymakers often promote SMMEs as a solution to create new firms and jobs (Maas & Herrington, 2007). In SA SMMEs generate 35% of the GDP, contribute 43% of the total value of salaries and wages, and employ 54% of all formal private sector employees (Nieman et al, 2009). The Gauteng Province is home to approximately 38% of all SMMEs in SA. This is indicative of the relative wealth of the Gauteng Province, and the extent to which the future economic growth of the province will determine growth for the entire South African economy (Econometrix, 2002:47). In terms of manufacturing competitiveness, SA has been characterised as being ineffective and inefficient. SA is ranked forty-five out of a total of 133 participating countries/economies, as recorded by the Global Competitiveness Index (GCI) 2009-10 rankings (WEF, 2009). The GCI provides a holistic overview of factors that are critical to driving productivity and competitiveness and groups them into nine pillars, all of which are crucial to ensure competitiveness. Government and business have attempted to promote growth by encouraging local production of manufactured goods which were previously imported. The South African manufacturing industry has been plagued by protectionist policies, weak competition policy, low levels of foreign investment, uncompetitive practices and state ownership (Kotze & Kotze, 1997:3); all of which have reduced the ability of South African manufacturing firms to compete efficiently. Additionally, various shortcomings in terms of leadership competencies have been identified in manufacturing firms (Mollo, Stanz & Groenewald, 2005:34).

Manufacturing is an important sector in the South African economy that needs to position itself for greater global participation. Yet, in many cases, it lacks the ability to make the quantum leap necessary for global competitiveness. Recognising this situation, the South African Government has demonstrated commitment by encouraging, guiding and supporting the manufacturing sector (Ngubane, 2003:3). Particular emphasis has been placed on labour-intensive programmes which generate more direct and indirect local employment opportunities and income by using locally available inputs (materials, simple tools and labour) (Thwala, 2008: 103).

According to Bloch and Dorfling (2000:39) the VTR has a self-employment rate of approximately 9%, which is substantially higher than the national rate as a whole. Therefore, one of the many goals of GAUMAC Vaal is to assist small manufacturing activities and to grow the SMME manufacturing firms.
The VTR, consists of the Sedibeng Municipal Area (SMA) and the Metsimaholo Municipal Area (MMA), which are made up of several different districts. Manufacturing activities in SMA consist of metal, metal products and machinery manufacture, constituting 81% of all manufacturing activities in SMA. Fuel, petroleum and rubber industries are responsible for 89% of manufacturing activities in MMA (Slabbert & Dorfling, 2001:44). The VTR was identified as one of the focus areas of the Gauteng Special Economic Zone Programme (GSEZP). The programme, which forms part of Gauteng's Blue IQ Programme, involved a strategic intervention that was aligned with the Spatial Development Initiative (SDI) criterion. This criterion encourages the opening up of the economic potential in areas with under-utilised industrial or infrastructural capacity by targeting strategic industrial assets that are important to the growth of the regional economy. Based on these initiatives, where the survival of the VTR is dependent upon SMME activity (Manmohan, 2003), the relevance and importance of the study becomes unmistakable.

SMME OPERATIONS AND SUSTAINABILITY

Operations, as described by Stevenson (2002:11), are the management of systems and processes that are involved in the manufacturing of products. According to Gaither and Frazier (1999:15) operations management is the management of an organisation's production system that converts inputs into the organisation's products/services. The operations function is responsible for the conversion process through which manufactured goods satisfy customer's requirements, are of generally good quality, competitively priced as well as provide excellent customer service (Stevenson, 2002:8). Regardless of what type of product is being manufactured, operations will always be at the core of all manufacturing enterprises (De Wit et al, 2007:11). The production operations function is also identified as a value-adding function (Stevenson, 2002:11) to which a large percentage of the organisation's revenue is allocated, while at the same time this function presents opportunities to improve productivity, profitability and/or reduce costs (Allen, 2007: 279).

Previous research indicates that the operations function in SMMEs generally has a poor relationship with other functions in the business (Dorf & Byers, 2008). Furthermore, the individuals involved in executing operations management are poorly trained, lack specific skills and are largely technologically illiterate (Sohal et al, 2000: 440). Indeed, the survival and growth of SMMEs are threatened by obstacles that may exist in the operations functional area (Allen, 2007; 277). One of these barriers suggests that entrepreneurs with technical backgrounds would probably be weak in managing functional areas such as general management and operations, while successful entrepreneurs have developed the requisite operations and management skills (Pycraft et al, 2003: 9). Other researchers have found that although entrepreneurs are expected to have expertise or skills in the operations function, their lack of training in the field of operations limits the entire business (Shepard et al, 2000:405). A study of successful SMMEs indicates that a minimum of five years is required to develop the necessary operations and management skills to ensure sustainability (Barreira, 2004:33).

Business failure is often attributed to the lack of entrepreneurial knowledge and business management skills (El Namaki, 1990:78; Scarborough & Zimmerer, 1996). Low levels of education and training, as well as poor business skills are contributing factors to the lack of capacity and poor business efficiencies amongst SMMEs (Yanta, 2001:47). Most entrepreneurs often start a new enterprise while ignorant of many key dimensions of running their own enterprises and must obtain the necessary skills if they are to survive (Shepard, Douglas & Shanley, 2000:394). It is imperative that the entrepreneur be knowledgeable about all the functional areas in business. The importance of entrepreneurial skills, such as innovation and risk taking should not be overlooked as essential ingredients to SMME success (Allen, 2007; Nieuwenhuizen & Kroon, 2002).

Skills development and education, in general, form part of human capital and according to human capital theorists these assets can improve SMME productivity significantly (Honig, 2001:79). Entrepreneurs who have built high-growth companies have solid entrepreneurial and management skills. Competency in a variety of skills will contribute to the profitability and sustainability of a business (Chrisman & McMullan, 2000:37), and a focus on skills development in the operations function is key to competitiveness and growth for SMMEs (Manmohan, 2004). Developing countries, such as SA, are characterised by uncertain market conditions and high failure rates of SMMEs, and mere survival may be equated with sustainability and success. SMMEs may be termed successful if they have endured the first two critical years of existence and the owner has met the majority of his goals and objectives (Kesper, 2001:51).

The type of operations knowledge and skills that SMMEs require are embedded in the decisions they need to make in their production operations systems (Allen, 2007). Production operations are executed by making decisions about all the activities of production systems, and include strategic, operating and control decision-making (Gaither & Frazier, 2002:18). When determining the type of operations knowledge and skills that SMMEs require, perhaps there is no better approach than the examination of the decisions that are typically made in a production operations environment.

Strategic decisions are concerned with the long-term plan and may include the following:

- Deciding whether to launch a new-product development project.
- Deciding on the design for a production process for a new product.
- Deciding on how to allocate raw materials, utilities, production capacity and other resources.
- Deciding what new businesses are required and where to locate them.

Operating decisions pertain to issues relating to planning production in order to meet customer's demands. The principal responsibility of operations is to take the orders for products and to deliver the finished product to the customer. Decisions are made in terms of:

- Deciding how much finished goods inventory to carry for each product.
- Deciding what products and how much of each to include in next months production schedule.
- Deciding whether to increase production capacity for next month through overtime and subcontract.
- Deciding the details of a raw material purchase plan to support next month's production schedule.

Control decisions are concerned with a variety of day-to-day execution issues in operations, such as, inferior quality and machine breakdowns. Control decisions may include the following:

- Deciding what to do about a department's failure to meet the planned baseline labour cost.
- Developing labour costs standards for a revised product design that is about to go into production.
- Deciding on what the new quality control and acceptance criteria should be for a product that has had a change in design.
- Deciding how often to perform preventative maintenance on a key piece of production machinery.

Control decisions concerning workers, product quality and production capacity, are often the most pervasive aspect of operations management in a manufacturing environment.

An important issue facing SMMEs worldwide is continuous improvement. In today's markets the inputs of customers and their fast changing needs makes it imperative that enterprises continuously improve the way business is conducted. SMMEs need to consider continuously improving production costs, delivery schedules, manufacturing skills, supplier relations and productivity in all practices (De Wit et al, 2007:27). According to Gaither and Frazier (2002:56), SMMEs constantly experience shortages in capital to employ skills. This lack of skills hinder the improvement of production capacity, which makes it necessary to continuously better their production strategies with customised products and process-focused operations. Moreover, SMME operations function should embrace competitive priorities of low production costs, fast on-time deliveries, high quality products and customer service. SMMEs that have adapted their production systems to be flexible and their costs and prices competitive will be able to compete and capture increased market share.

Based on accumulated findings and insights acquired from the literature review a hypothesis is formulated to address the study objectives. Since the study is of an explorative and descriptive nature, a broad inclusive hypothesis is formulated rather than numerous specific predictions.

Hypothesis: The mix of operations skills will reflect distinct factor structures. These factors representing operations skills are positively associated with SMME sustainability.

RESEARCH DESIGN

The study was cross-sectional in design and relied on trained fieldworkers administering surveys for data collection. Building on established constructs of SMME sustainability and operations skills, various measures were developed and tested for reliability and validity. Factor analysis was used to identify relevant factors in terms of operations skills. Correlational analysis was subsequently employed to test the hypothesized relationship.

A small number of fieldworkers were tasked with the collection of data with the following prerequisites. Fieldworkers should have some skills training in operations, preferably a learner who has completed a qualification in this field of management. Fieldworkers should be resident in the designated area, thus allowing for reduced travelling time and equal distribution of work. A strict weekly return schedule was implemented where fieldworkers were able to hand in the completed questionnaires. The researchers conducted training sessions and training manuals were provided to each fieldworker. Compulsory weekly meetings with fieldworkers were conducted for quality control purposes. The process of checking, returning, follow-up and re-checking of questionnaires was maintained throughout the duration of the survey. These procedures ensured that a very high response rate was obtained for the survey (87%).

Instrument

Based on the preceding conceptual investigations on the study variables, the concepts were operationalised and instruments designed. This procedure is supported by Huysamen (1976:168) who advocated that for a research hypothesis to be investigated empirically, the variables must be defined operationally.

In line with similar research, biographical data on individuals representing SMMEs and data on the SMMEs themselves was collected. Firm size, firm age, main business type, and the respondent's age, level of education, ethnic/race group and gender were included as control variables, i.e., typical variables identified in previous studies of the same nature (Wiklund, 1999:40).

In order to obtain a more complete picture and better understanding of operations skills within the SMME context, a number of focus group interviews and meetings were arranged. This method can generate a large amount of information for a questionnaire and can provide vital information that can be used to improve the measurement instrument (Dabholkar et al, 2000:139; Johnson et al, 1995:6; Vasquez et al. 2001:2). Focus groups provide the researcher with an excellent opportunity to gain preliminary insights into what respondents think or feel about the variables under study. Researchers may also gain additional information on variables, which may have been omitted in the literature review. Moreover, such an approach allows researchers to develop scales that can be later tested and refined through a larger sample survey design (Hair, Bush & Ortinau, 2002:562).

Operations skills included a vast array of previously identified skills in line with the operational decisions scrutinised in the literature review, these included:

- Inventory management – the functions of inventory management.
- Production planning and control – incorporates planning, scheduling and controlling of resources.
- Operational specifications – production and manufacturing specifications.
- Production measurement techniques – work study functions.
- Production quality management – quality management and control.
- Manufacturing budgets and costs – production financial management.
- Health safety and maintenance planning – aspects of health, safety, environmental and maintenance issues.

In terms of sustainability, there has been considerable debate on the issue of equating business success/sustainability with growth and the indicators used to measure these concepts may be different. The growth process is likely to be driven by an increased demand for the SMMEs products; that is, sales increase first, thus allowing for the acquisition of additional resources such as employees or machinery. It seems unlikely that growth in other dimensions could take place without increasing sales. It is also possible to increase sales without acquiring additional resources or employing additional staff, by outsourcing the increased business volumes. In this case, only sales would increase. In conclusion, sales growth has a high generality (Wiklund 1999:43). SMME sustainability was based on a measurement over a period of two years, with growth relative to that of their competitor performance. These indicators included: employment growth, growth in sales turnover, growth in profits, and growth in market value. These indicators were based on a two year period in order to allow for the calculation of the compound performance for a cumulative period. Using these measures reflects the multidimensional nature of sustainability. Due to resistance by the respondents to discuss sensitive financial information, the growth and financial ratio questions were structured instead to ask the opinion of the respondent on the various items, on a five point opposite statement scale ranging from *significant decline* to *significant increase*. All measures were subject to factor analysis to test for instrument reliability and validity.

Sampling and data collection

The population for this study focused on existing SMMEs in the Vaal Triangle Region. This region is composed of the Sedibeng Local Municipality as well as the Metshimaholo Local Municipality. The population comprises of owners and managers of manufacturing SMME enterprises. All respondents were solicited through the Sedibeng Office of the Gauteng Enterprise Propeller (GEP) and the Small Enterprise Development Agency (SEDA). A random sampling technique was used to ensure that all the relevant manufacturing sectors of the VTR were represented. The target sample was 125 respondents, with 87 eligible responses used as the final sample. For a SMME to qualify it must have been in existence for a minimum period of two years, and fit the SMME definition relating to the manufacturing sector (see table 1).

Table 1: SMME Classification

Sector or sub-sector in accordance with the Standard Industrial Classification	Size of class	The total full-time equivalent of paid employees	Total turnover	Total gross asset value (fixed property excluded)
Manufacturing	Medium	200	R51m	R19m
	Small	50	R13m	R5m
	Very small	20	R5m	R2m
	Micro	5	R0.20m	R0.10m

Source: The National Small Business Amendment Bill of the Republic of South Africa (2003).

RESULTS

Demographic analysis indicated that 60% of the respondents fell into the 30 to 49-year category and 67% of respondents were male. In terms of ethnic/race groups, Blacks represented the majority of the respondents – 70%. In terms of education, 25% of the respondents had completed matric, 14% had completed some form of short program, while 37% of the respondents had completed post-matric qualifications. Moreover, 60% of respondents had no training in the operations field while 20% had attended short courses on operations.

On SMME ownership types, 40% were operating as sole proprietors, 42% as closed corporations and 15% as partnerships. In terms of industry classifications, textiles were predominant with wood-based products on a lesser scale. To gauge SMME size - 64% of SMMEs employed between one and five staff, while 24% employed between six and 35 staff.

To identify key dimensions of operations skills in the SMME manufacturing sector, item statistics were initially calculated. In order to establish the consistency of the data, researchers commonly use the coefficient alpha (Cronbach's Alpha). The total reliability value for each item is displayed in Table 2. The overall Cronbach's Alpha was 0.952.

In order to test the various items, which denote operations, the principal axis factoring method was used in factor extraction. In order to use factor analysis two important tests, Kaiser-Meyer-Olkin (KMO) and Bartlett, must be applied. The KMO measure of sampling adequacy tests whether partial correlations among variables are small. If the value of the sampling adequacy is >0.5 and <1.0, this indicates that a factor analysis may be useful with the relevant data and if the value of the sampling adequacy is <0.5, this indicates that the factor analysis may not be very useful. The Chi-Square application was used in the KMO and Bartlett's tests. This type of test indicates the suitability of the data for structured detection. Bartlett's Test of Sphericity tests whether the correlation matrix is an identity matrix, which could indicate that the factor model is inappropriate. If the significance value is <0.05, this indicates that the factor analysis approach pertaining to the relevant data may be useful. The KMO measure of sampling adequacy (MSM) was considered to have a strong positive relationship, according to the rule of thumb on strengths of correlations coefficients (Kaiser, 1974:31).

The factor loading matrix for operations skills is displayed in Table 3 below. All variables that loaded above 0.30, in accordance with specifications used as a cut-off basis (Comrey & Lee, 1992:430) were tabled. The naming of factors is a subjective process and one should always examine the variables that load highly on a factor rather than relying on the name provided by someone else (Tull & Hawkins, 1993:701). In order to name the factors the loadings as well as the constituent items for a particular factor were examined. Five discernable factors were identified.

The various sustainability indicators all loaded on one factor, which was labelled business sustainability. This 1-factor solution, had an eigenvalue of 9.345, and explained 87% of the variance. The rotated factor loadings varied between 0.398 and 0.856 for this factor (not shown). Item statistic results for SMME sustainability indicate an overall Cronbach Alpha of 0,930. According to the rule of thumb on strengths of correlations this value is regarded as having a strong positive relationship and is also considered meritorious. Table 4 below outlines these item statistics. Correlations between operations skills and

business sustainability are reported with their respective coefficient values, with the second line of each row indicating their *p* values. The Pearson correlation coefficients range from 0,580 to 0,720, which indicate a moderate to strong positive linear association between these variables. Moreover, all coefficients are significant at the 0.01 level. These values provide support for the hypothesis which may be accepted, i.e. operations skills are positively associated with SMME sustainability. The results further reveal that most of the operational skill factors appear to be vulnerable to multicollearanity, which is not unusual considering these are various dimensions of one construct.

Table 2: Item statistics for operations skills items

	Correlated Item Total Correlation	**Cronbach's Alpha if Item Deleted**
Stock-keeping abilities	0,612	0,951
Ability to determine order requirements	0,529	0,951
Buying ability	0,424	0,952
Ability to determine labour requirements	0,655	0,950
Ability to determine machinery and equipment requirements	0,369	0,952
Ability in correctly determining lead times	0,590	0,951
Ability to correctly schedule different orders	0,593	0,951
Ability in satisfying customer due dates	0,303	0,953
Ability in formulating manufacturing specifications	0,502	0,951
Ability in setting up production targets	0,729	0,950
Ability to perform a work method exercise	0,685	0,950
Ability to perform a work measurement exercise	0,692	0,950
Ability to construct a production standard	0,738	0,949
Ability in formulating production specifications	0,638	0,950
Ability in measuring productivity	0,715	0,950
Ability in measuring efficiencies	0,727	0,949
Ability in measuring utilisation	0,794	0,949
Ability in forecasting	0,722	0,949
Ability to ensure customer satisfaction	0,438	0,952
Ability in eliminating or reducing production problems	.0586	0,951
Ability in developing a production budget	0,742	0,949
Ability to correctly determine the production cost per unit	0,623	0,950
Ability in developing new products	0,480	0,952
Ability to perform production layout exercises	0,734	0,949
Ability to perform material handling exercises	0,718	0,950
Ability in performing continuous improvement exercises	0,666	0,950
Ability in performing value analysis exercises	0,707	0,950
Ability in formulating a maintenance plan	0,613	0,951
Ability in developing health, safety and environmental policies	0,569	0,951

Table 3: Final sorted factor structure for operations skills

Factor 1: Inventory Management	**Factor loadings**
Ability to determine order requirement	0,783
Stock keeping abilities	0,726
Ability to formulate production specifications	0,646
Buying abilities	0,621
Ability to perform material handling exercises	0,464
Factor 2: Production Planning and Control	
Ability to correctly schedule different orders	0,843
Ability to determine labour requirements	0,778
Ability to correctly determine lead times	0,695
Ability to set up production forecasts	0,525
Ability to determine machinery and equipment requirements	0,397
Ability to satisfy customer due dates	0,393
Factor 3: Operational Specifications and Quality	
Ability to develop new products	0,797
Ability to formulate manufacturing specifications	0,644
Ability to formulate production specifications	0,611
Ability to ensure customer satisfaction	0,534
Ability to perform continuous improvement exercises	0,325
Factor 4: Production Measurement Techniques	
Ability to measure utilisation	0,876
Ability to construct a product standard	0,862
Ability to measure efficiencies	0,823
Ability to perform a work measurement exercise	0,817
Ability to measure productivity	0,805
Ability to perform a work method exercise	0,776
Ability to perform a production layout exercise	0,768
Ability to set up production targets	0,762
Ability to eliminate or reduce production problems	0,598
Factor 5: Support Production Requirements	
Ability to develop a production budget	0,863
Ability to develop health, safety and environment policies	0,746
Ability to formulate a maintenance plan	0,745
Ability to perform value analysis exercises	0,718
Ability to correctly determine the production cost per unit	0,619

Table 4: Item statistics for SMME sustainability indicators

	Corrected Item – Total Correlation	**Cronbach's Alpha if Item is Deleted**
Employment growth over the past two years	0,788	0,918
Employment growth against competitor, over the past two years	0,763	0,921
Growth in sales turnover over the past two years	0,799	0,917
Growth in sales turnover against competitor, over the past two years	0,829	0,914
Growth in profits, over the past two years	0,768	0,920
Growth in market value over the past two years	0,757	0,922
Growth in market value against competitor over the past two years	0,745	0,922

Table 5: Correlations matrix for operations factors and SMME sustainability

		Inventory	Production plan/control	Operations specifications	Production management	Support production	Business Sustainability
Inventory	Pearson Correlation	1	0,681 **	0,802 **	0,748 **	0,692 **	0,720 **
	Sig. (2-tailed)		0,000	0,000	0,000	0,000	0,000
Production plan/control	Pearson Correlation	0,681 **	1	0,653 **	0,557 **	0,614 **	0,580 **
	Sig. (2-tailed)	0,000		0,000	0,000	0,000	0,000
Operations specifications	Pearson Correlation	0,802 **	0,653 **	1	0,779 **	0,698 **	0,644 **
	Sig. (2-tailed)	0,000	0,000		0,000	0,000	0,000
Production management	Pearson Correlation	0,748 **	0,557 **	0,779 **	1	0,762 **	0,648 **
	Sig. (2-tailed)	0,000	0,000	0,000		0,000	0,000
Support production	Pearson Correlation	0,692 **	0,614 **	0,698 **	0,762 **	1	0,698 **
	Sig. (2-tailed)	0,000	0,000	0,000	0,000		0,000
Business Sustainability	Pearson Correlation	0,720 **	0,580 **	0,644 **	0,648 **	0,698 **	1
	Sig. (2-tailed)	0,000	0,000	0,000	0,000	0,000	

** Indicates Pearson Correlations are significant at the 0.01 level (2-tailed tes

CONCLUSIONS AND RECOMMENDATIONS

This study investigated the prevalence of operations skills in SMMEs to ascertain associations with sustainability. As hypothesised and based on the empirical findings, operations skills are positively associated with SMME sustainability. The centrepiece of this study confirms that a strong positive relationship, by which a linear association can be identified, exists between operations skills and SMME sustainability.

The literature review revealed the operations function as having a poor relationship with other management functions, where operations staff are typically poorly trained and lack tertiary qualifications. More recently, research has focused on the pressures of globalisation and compressed cycle times which have transformed both the nature and processes of the operations function (Sohal et al, 2001:444). This present study has made a modest contribution to theoretical development by highlighting the relevance of operations skills in an emerging country context and sustainability, which may indeed be a precondition for SMME success and survival in a globalised environment.

As highlighted in the literature, high failure rates of SMMEs are not only attributed to low levels of education and training (Ibrahim & Soufani, 2002:426), but particularly because the entrepreneur is a generalist (Hodgetts & Kuratko, 1989), with limited ability to manage operations. Typically in large organisations the value analysis function is performed by a project team and the production operations manager is an important role player in the team. However, in SMMEs, the owners themselves are required to perform this value-adding function in the production process. Value analysis in SMME operations requires critical thinking and necessitates the management of the primary as well as the secondary functions of the manufacturing process, often at the same time – this underscores the importance of operations in a SMME environment (Pycraft et al, 2003:11). Furthermore, a crucial inter-relationship exists between operations management and all the other functional areas in a typical SMME.

Not only did the study focus on a neglected area of SMME research, the relevance of operations in SMMEs in a high-density manufacturing region, but has also contributed towards improved understanding of this pivotal function to SMME sustainability. By adopting an empirical approach and through various statistical testing the study has added rigor to a topic where previous generalisations were prevalent, and can now be studied in a more systematic manner with valid and reliable instruments.

The results of this study resonate with several initiatives underway in SA to try to improve SMME sustainability. The South African national, provincial and local governments are continuously striving towards the transference of skills so that the failure rate of SMMEs can be minimised (RDP Monitor, 2000:7). Upgrading the skills level of SMMEs is therefore an important priority in addressing economic growth and combating unemployment in SA. Previous studies have supported the notion that a relationship exists between poor levels of education, low levels of business skills, reduced business efficiency and lack of capacity, all of which are common among South African SMMEs. Moreover many SMMEs themselves believe that their competitiveness has suffered because of skill shortages (Yanta, 2001:44; Mclarty, 2000:618). Similar research (Ladzani & Van Vuuren, 2002:156) has found that in rapidly changing environments, entrepreneurial training is necessary in helping owners/managers of SMME's learn how to approach different managerial functions effectively. The findings of this present study support the call for more targeted training interventions where operations are core to the survival of many SMMEs. Skills transference by means of training and outcome-based education (OBE), using interactive workshops which are based on action learning and role-playing, are recommended. As the literacy levels of many SMMEs owners are low, traditional training methods such as lectures, seminars and short courses may not always be most suitable for the transference of operations skills.

As part of government's initiative to empower and enhance the skills of SMME owners, policies should encourage the development of specific functional skills of which operations is central to sustainability.
In order for SMME's to be sustainable, development must be efficient and based on sound business principles and on the commercial discipline of the market (Sindane, 1998:75), only then will the potential benefits of sustainable SMMEs be evident. Moreover policymakers encouraging SMME development need to take cognisance of the complexity of factors involved in operating an SMME under present

conditions and due consideration needs to be given to operations and its impact on business sustainability.

SMMEs, educators, consultants and policymakers could all benefit by understanding the multifaceted nature of operations skills with targeted training and specific skill interventions focused on developing operations skills. One of the prerequisites for SMME registration should be that prospective SMMEs provide evidence of operations skills training. Indeed, it remains imperative to focus on developing

operations skills by relying on afrocentric management perspectives, and acknowledging cultural diversity and ethnicity in the workplace. This allows for appreciation of the other view and the different value orientations with respect to management (van Den Heuvel, 2008: 52).

A limitation of this study is that results cannot be extrapolated to the entire South African SMME landscape. The respondents were from specific municipal districts in the VTR, and subsequently the limited sampling frame limits generalisation. Additionally a cross-sectional design study prohibits any causal inferences, and thus directionality between the variables was not fully explored. Another limitation relates to the fact that this study did not ask for respondents to reveal audited financial information during the survey. Therefore, data on sustainability indicators cannot be cross-referenced with actual audited financial statements. Furthermore, the use of a survey as a primary data collection method implies certain limitations, such as self-reporting which may have resulted in over inflated responses in some instances.

Nonetheless, this study has made an important contribution to the field of entrepreneurship in terms of its conceptual integrations with previous research and its empirical approach to an under-researched topic. Future research on this topic could include employing a longitudinal design to monitor the effect of increased levels of operations skills on SMME sustainability.

REFERENCES

Allen KR. 2007. New venture creation. 5th International edition. United States: South-western, Cengage Learning.

Barreira JCD. 2004. *The influence of business knowledge and work experience as antecedents to entrepreneurial success*. Unpublished doctoral thesis. Pretoria: University of Pretoria, School of Management Sciences: 12-169.

Bloch R & Dorfling T. 2000. Vaal Region: Industrial regeneration potential. *Final Report,* June: 4-72.

Bukula S. 1995. Environment for SMME's. What is new? Small Business. *African Business*: 12-14.

Butcher C. 1999. DTI – positioning South Africa for global competitiveness. Institute of Marketing Management. *Professional Marketing Review*, April: 1-15.

Bygrave W & Minnitti M. 2000. The social dynamics of entrepreneurship. *Entrepreneurship Theory and Practice*, 24(3):25-36.

Cape Metropolitan Council. 2000. Economic and Social Development Directorate: Good practice lessons and case studies for the delivery of economic development Service. *Small, Medium and Micro Enterprises (SMME's) Support Services*: 1-55.

Chrisman JJ & McMullan EW. 2000. A preliminary assessment of outsider assistance as a knowledge resource: The longer term impact of new venture counselling. *Entrepreneurship Theory and Practice*, 24(3):37-53.

Clover TA & Darroch MAG. 2005. Owner's perceptions of factors that constrain the survival and growth of small, medium and micro agribusinesses in KwaZulu-Natal, South Africa, *Agrekon*, 44(2):238-263.

Comrey AL & Lee HB. 1992. *A first course in factor analysis.* 2nd Edition. Hillsdale, NJ: Lawrence Erlbaum.

Dabholkar PA, Shepherd CD & Thorpe DI. 2000. A comprehensive framework for service quality: An investigation of critical conceptual and measurement issues through a longitudinal study. *Journal of Retailing,* Summer, 76(2):139-174.

Davies TA. 2001. Enhancing competitiveness in the manufacturing sector: Key opportunities provided by inter firm clustering. *Competitiveness Review,* 11(2):4-12.

De Wit P, Kruger D & Ramdass K. 2007. *Operations Management*. Cape Town: Oxford University Press.

Dorf RC & Byers TH. 2008. *New Technology Ventures.* 2 ed, Irwin, McGraw-Hill.

Econometrix. 2002. Small, medium and micro-sized enterprises in the South African economy: growth, size, contributions and trends. *SMME Profile*: 37-55.

El Namaki MSS. 1990. Small Business: The myths and the reality. *Long Range Planning*, 23(4):78-87.

Franz L. 2000. Making small business a big issue again. *Martin Creamer's Engineering News*, 20(30), August: 12-18.

Gaither N & Frazier G. 1999. *Production and Operations Management.* 8th Edition. Cincinnati, Ohio: Thomson.

GAUMAC. 2001. *A Newspaper for SMME's.* Gauteng [Online] Available from: http://www.bulletinonline.co.za/archives/leading/december2001.php [Accessed 10/07/2005].

Hair JF Jr, Bush RP & Ortinau DJ. 2002. Marketing research within a changing information environment, 2nd Edition. Boston: McGraw-Hill.

Heizer J & Render B. 2004. Operations Management. 7th Edition. International Edition. New Jersey: Prentice Hall. Pearson Education.

Hodgetts KM & Kuratko DF. 1989. *Effective small business management*. San Diego: Harcourt Brace Jovanovich Publishers.

Honig B. 2001. Learning strategies and resources for entrepreneurs and intrapreneurs. *Entrepreneurship Theory and Practice*, 26(1):79-80.

Huysamen GK. 1976. Introductory statistics and research design for the behavioural sciences. Cape Town: Academia.

Ibrahim AB & Soufani K. 2002. Entrepreneurship education and training in Canada: A critical assessment. *Education and Training*, 44(8/9):421-430.

Johnson RL, Tsiros M & Lancioni RA. 1995. Measuring service quality: A systems approach. *Journal of Services Marketing*, 9(5):6-19.

Kaiser HF. 1974. An index of factorial simplicity. *Psychometrike,* 29(1):31-36

Kesper AP. 2001. Making a living in the city. Success and failure of small enterprise in the Johannesburg Inner City. *Africa Insight*: 50-58.

Kotze PE & Kotze FC. 1997. The dynamic of South African manufacturing competitiveness. Industrial Development Corporation of South Africa Limited. *The Department of Economic Research and Development*: 1-11.

Ladzani WM & Van Vuuren JJ. 2002. Entrepreneurship training for emerging SME's in South Africa. *Journal of Small Business Management,* 40(2):154-161.

La Porta R & Schleifer A. 2008. *The unofficial economy and economic development, National Bureau of Economic research.* Working paper No. 14520, Massachusetts: National Bureau of Economic Research.

Luiz J. 2002. Small business development. Entrepreneurship and expanding the business sector in a developing economy: The case of South Africa. *The Journal of Applied Business Research,* 18(2):53-68.

Maas G & Herrington M. 2007. *Global Entrepreneurship Monitor*, South African Report. Graduate School of Business: University of Cape Town.

Manmohan M. 2003. GAUMAC's role in supporting SMME's in the Vaal Triangle Region. *GAUMAC–Vaal*: 1-2.

Manmohan M. 2004. The Economic State of the Vaal Region. *GAUMAC–Vaal*: 1-2.

Mclarty R. 2000. Evaluating graduate skills in SME's: The value chain impact. *Journal of Management Development,* 19(7):615-628.

Mollo SM, Stanz K & Groenewald T. 2005 .Leadership competencies in a manufacturing environment. *South African Journal of Human Resource Management*, 3 (1): 34-42.

Naude W. 1998. SMME's and economic development in South Africa. Africa Institute of South Africa. *Africa Insight,* 28(3/4):133-145.

Ngubane B. 2003. Launch of the National Advanced Manufacturing Technology Strategy. *CSIR Document*: 3.

Nieman G, Hough J & Nieuwenhuizen C. 2003. *Entrepreneurship*: *A South African Perspective.* Pretoria: Van Schaik.

Nieuwenhuizen C & Kroon J. 2002. Creating wealth by financing small and medium enterprises of owners who posses entrepreneurial skills. *Business Dynamics,* 11(1): 21-28.

Nieman G & Nieuwenhuizen C. (Editors). 2009. *Entrepreneurship: a South African perspective*. 2nd Edition. Pretoria: Van Schaik.

Perks S & Smith EE. 2008. Focused training programmes for solving growth problems of very small businesses. *Acta Commercii*: 145-159.

Perks S & Struwig M. 2005. Skills necessary to grow micro entrepreneurs into small business entrepreneurs. *South African Journal of Economic and Management Sciences*, 8(2): 171-185.

Pycraft M, Singh HS, Phihlela K, Slack N, Chambers S, Harland C, Harrison A & Johnston R. 2003. *Operations Management,* South African Edition*.* Great Britain: Pitman Publishing.

Scarborough NM & Zimmerer TW. 1996. *Effective small business management.* 5th Edition. Upper Saddle River, NJ: Prentice Hall.

Seda. 2007. Review of trends on entrepreneurship and the contribution of small enterprises to the economy of South Africa, 2000-20006, Johannesburg: Seda.

Shepard DA, Douglas EJ & Shanley M. 2000. Ignorance, external shocks, and risk reduction strategies. *Journal of Business Venturing,* 15:393-410.

Slabbert TJC & Dorfling TK. 2001. *Prospects for the regeneration of the Vaal Triangle economy.* Report presented to the Committee of Mayors and Managing Directors of the Key Industries of the Vaal Triangle: Vanderbijlpark.

Sohal AS, D'Netto B, Fitzpatrick P & Noori H. 2000. The roles and responsibilities of production/operations managers in SME's: Evidence from Canada. *Technovation,* 21:437-448.

South Africa Survey. 2007. Survey results in Kane-Berman, J. (ed.) *South African Institute of Race Relations,* Johannesburg, South Africa: SAIRR.

Stevenson WJ. 2002. *Operations Management*, 7th Edition. International Edition. New York: McGraw-Hill/Irwin Publishers.

The National Small Business Amendment Bill of the Republic of South Africa. 2003. *Government Gazette.* No. 24628.

Tull DS & Hawkins DI. 1993. *Marketing research: Measurement and method.* 6th Edition. London: Prentice-Hall International.

Thwala, WD. 2008. Employment creation trough public works programmes and projects in South Africa: experiences and potentials. *Acta Commercii:* 103-112.

Van Den Heuvel H. 2008. Hidden messages' emerging from afrocentric management perspectives. *Acta Commercii*: 48-54.

Vasquez R, Ignacio A, Del-Bostique R, Diaz AM. & Ruiz AV. 2001. Service quality in supermarket retailing: Identifying critical service experiences. *Journal of Retailing and Consumer Services,* 8:1-14.

Wiklund J. 1999. The sustainability of the entrepreneurial orientation—performance relationship. *Entrepreneurship Theory and Practice*, 24, 37-50.

World Economic Forum. 2009. [Online] Available from: http://www.weforum.org/documnts/gcr/index.html [Accessed 30/11/2009].

Yanta T. 2001. Local government supporting or stunting SMME growth? University of Natal. Centre for Applied and Social Sciences. *Indicator South Africa: a barometer of social trend,* 18(2):44-48.