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APPLICATION OF MANUFACTURING STRATEGY PRINCIPLES IN ADAPTING CRAFT BREWERS FOR SUSTAINABLE GROWTH IN THE SOUTH AFRICAN BEER INDUSTRY

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ABSTRACT

The beer industry is known for having few big producers who dominate and control the market such that it is considered saturated and mature with high barriers to entry. Nevertheless, in-roads into the beer market by much smaller players, namely craft brewers are observed, that are apparently growing and managing to retain market share. Being SMMEs, the ability of craft brewers to achieve this position points to their agility and resilience, however it is not clear how this is achieved through the manufacturing function expected to meet consumer requirements. This raises the question whether craft brewers use manufacturing strategies at all and if these align with consumer needs and company long term plans.

This study investigates the craft beer industry in South Africa by interviewing five craft beer producers and surveying over four-hundred consumers to understand expectations of consumers and practices of craft brewers regarding manufacturing strategy.

Results indicate that application of manufacturing strategy principles is limited and does not seem purposive to improve the manufacturing process and sustain performance but seems to be survival moves. This suggests long-term risk to stability of craft breweries in South Africa and the need to adapt manufacturing strategy principles to improve this.

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1 INTRODUCTION

There are many economic and brand benefits that can be realised through the consideration of product differentiation, specifically in the fast moving consumer goods sector [1]. This is especially true in the beer industry where there has been a noticeable change in the types of beer that are preferred by the consumers in markets that were previously thought to be saturated and mature.

The growth of craft beer in recent years is largely attributable to consumer changing tastes and earning potential of craft breweries. These craft breweries are perceived to be producing a more diverse, higher-quality beer than the traditional mass-produced products that are manufactured by the commercial brewing giants of the world such as ABInBev, Heineken and others [3]. Craft brewing continues to take market share away from traditional non-craft brewers in recent years [4].

The beer business has consistently shown that it is a high volume, low margins industry, a characteristic of the FMCG sector that it belongs to [5]. This presents a high cost barrier to entry and requires economies of scale to overcome. Competing on high volume and low margins is currently not widely available to Craft Brewers as they are confined to producing small batches of products and sell to a much localised market. This however, may not be a perceived weakness as it is the attribute that allows craft brewers to diversify their portfolio and produce beers that are very specific in style and have a broad offering in contrast to the highly inflexible mass production of large scale breweries.

Nevertheless, the sustainability of craft brewers' growth is questionable given that little or no strategies seem to be in place to survive and remain sustainable. Being SMEs, standing up against the more resourced and hostile competitors and holding their own requires agility and resilience as the big players react to the threat. There is need to investigate the growth and impact of craft brewers in the highly competitive FMCG environment, what significance this has for corporate brewers as this will determine the level of reaction craft brewers can expect, and the implication for craft brewers using manufacturing strategy to achieve sustainability.

2 LITERATURE REVIEW

2.1 Craft brewing in South Africa

The history of craft brewing and its origins is varied across the world but appears to have evolved as a result of the amalgamation of corporate brewers that resulted in what can be described as a standard offering and diminishing variety of traditional beer taste and the birth of home brewing by passionate consumers [6]. The quality of these beers improved significantly over time and this was followed by their popularity from those who were seeking more from their drink than just a beer [7]. In South Africa where the apartheid regime prevented the majority of the population to legally consume alcohol until the dawn of democracy, the illegal brewing and trading of alcohol remained suppressed and thus no major inroads into beer brewing were made [4]. This gave rise to the large contingency of "shebeens" across the country where traditional alcohol could be made and sold. These however were never made part of the formal sector. In the formal sector, South African Breweries (SAB) continued to dominate the brewing industry with very little competition.

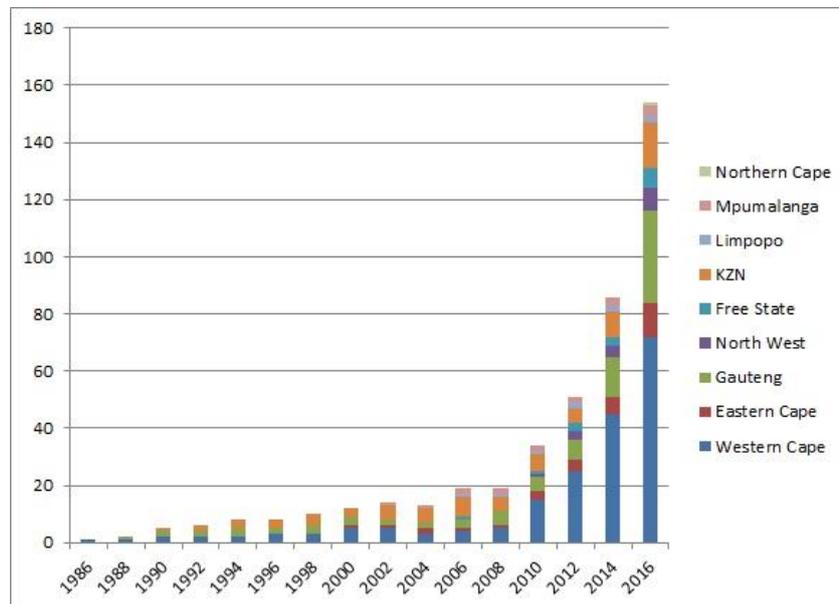


Figure 2-1: Growth of craft breweries in South Africa over the years [6].

Figure 2-1 clearly shows that the majority of the craft breweries built are in the Western Cape province of South Africa followed by the Gauteng Province. It also shows an exponential growth in the number of craft brewery operations registered in South Africa.

In recent years, the total volume of beer has increased by 1.5% compared to the overall growth in total liquor consumption of 2.0% per year and considering that the population growth in South Africa has grown at a rate of over 2.0% per annum, this means that the per capita consumption of liquor has declined overall [8].

The South African craft beer scene growing from a relatively small base compared with other markets reported an estimated 30 per cent growth in 2015, followed by an accelerated 35 per cent growth in 2016 and estimates of up to 18 million litres of craft beer by the end of 2017 [2]. Given the high rate of growth in craft beer, one can infer that craft beers are gaining market share in South Africa from the conventional beer market where large corporates like ABInbev and Heineken are operating.

2.2 Manufacturing Strategy

Manufacturing strategy is summarised as the total set of decisions that shape the long term capabilities of an organisation's operation and how they contribute to the overall business strategy [9]. Quantifiable strategic objectives that indicate the "end state" that the organisation hopes to achieve by addressing what it deems to be the opportunities available in the market and the challenges in achieving its objectives are put together. When these have been put together some strategic intents are laid down to drive a path of achieving these objectives through work programmes and control measures which are put in place to monitor progress against timelines [10]. There must therefore be an alignment between the overall business strategy and the more specific manufacturing strategy. To achieve this level of alignment, the manufacturing strategy's main objectives must not only be based on developing capabilities in the areas such as cost, quality, reliability, and flexibility, but must have an overarching purpose of realising long term increasing market share and profitability [11].

Manufacturing strategy undertakes to look at developing capabilities in fulfilling performance objectives for manufacturing that may include one or more of the following objectives, namely, quality, cost, flexibility and reliability of the organisation.

2.3 Manufacturing strategy frameworks

2.3.1 The Framework

A framework consists of the selected theories that underlines the thinking with regards to how one understands the topic which in this case is manufacturing strategy, as well as the concepts and definitions from that theory that are relevant to the topic [13]. The most common manufacturing strategy framework found by the researcher consists of how strategy is made and the constituents of a manufacturing strategy as shown in Figure 2-2.

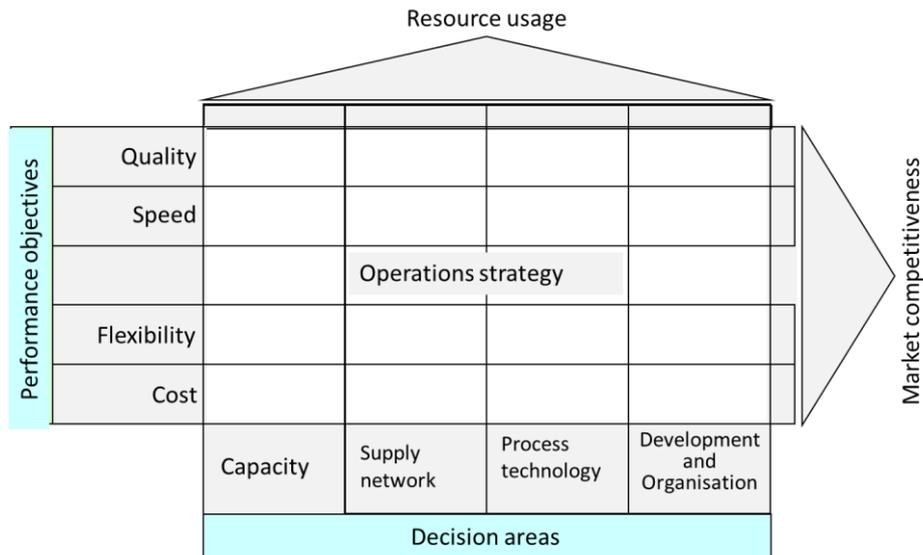


Figure 2-2: Manufacturing strategy theoretical framework [9].

The concepts and constituents of the manufacturing strategy as presented in Figure 2-2 are explained in the following subsections. Evidence of manufacturing strategy will be presented when a firm deliberately has a total pattern of decisions on all the interlinked constructs to improve operations and sustainability.

2.3.2 Strategic Decision Areas

2.3.2.1 Brewery Capacities

2.3.2.1.1 LOCATION OF THE MANUFACTURING FIRM

Breweries are demand driven operations where large proportions of the volume of beer they produce are distributed as perishable goods. As a result, the distribution costs of a brewery tend to account for a large proportion of the costs of running such a business. In order to decrease the costs associated with distribution, it is important for the manufacturing plants to be located in population centres. These decisions are made early on in the planning phase of building a brewery to define the ideal location. Locations of demand driven operations are chosen primarily in proximity to labour, transportation and technology while meeting procurement/distribution requirements of the firm [14]. Manufacturing firms also need to consider the proximity to the supply of water, electricity, waste streams and supply of raw materials which may affect the quality and costs of the operations and products. The location of a brewery in general forms part of a strategic decision that forms part of the overall manufacturing strategy [15].

2.3.2.1.2 CAPACITY OF THE MANUFACTURING FIRM

Capacity decisions for any brewery are highly interconnected with the quantity of beer it is able to produce and the flexibility it is able to do. This is determined by the equipment and human capital that is currently employed by the firm [12]. In a conventional manufacturing operation, important capacity decisions include how to deal with cyclical demand that is inherent in the beverage sector, whether to add capacity in anticipation of forecasted market conditions and how to use capacity to improve the economies of scale of the organisation [16]. This is to be investigated at craft brewery level.

2.3.2.2 Process Technology

A brewery like any manufacturing system is an input-output system in which manufacturing resources such as raw materials and energy are transformed into products. One way by which breweries adapt to the environmental dynamics is the engagement in manufacturing process technology. Employing the correct technology in manufacturing can result in reduced operations cost, improved quality of products and flexibility [17]. There is a requirement for manufacturing firms to adapt production processes to the latest technological trends and developments and adapt to environmental dynamics including short product life cycles, growing product complexity, and rapid advances in technologies by continuously engaging in manufacturing process innovation [18]. There have been major developments in the industry in recent times which include refrigeration and pasteurization to preserve the beer quality, with today's advances having to do with brewery equipment and quality control. Most large commercial breweries are built with stainless steel material of construction for equipment in direct contact with the beer and have advanced heating and cooling systems. In a brewing environment, the employment of process technology will enhance other manufacturing strategy objectives such as cost, quality and reliability. The extent of sophistication of the process technology largely depends on the ability of the firm to invest capital to realise the benefits. Such resources are generally not available to firms on a small scale such as craft brewers in contrast with larger corporations that can invest heavily in process technology to automate tasks and realise benefits associated with the investment. As equipment becomes more specialized, it also becomes more expensive. Moreover, upgrades may be necessary to maintain competitive advantage; however, a reasonable return on investment may be more difficult to achieve for the smaller and less resourceful craft brewers [19].

2.3.2.3 Organisational Structure

The degree of decentralization and "divisionalization" of the organisation affects the allocation of decision-making responsibilities among department managers, whereas the relative use of cost and profit centres within a business unit affects the allocation of decision-making responsibilities among business unit managers and functional manufacturing managers [16]. All the factors that can impact on the designing of the organisational structure should be well analysed and decisions made as part of strategy formulations to make them fit for purpose for that particular organisation [20]. McMillan [21] states that there is a strong link between organisational structure and the size of the organisation's facilities, process technologies employed, operating environment and culture. It follows that the organisation structure that is in place in craft breweries should be informed by variables it affects and complements as part of its overall manufacturing strategy.

2.3.2.4 Vertical integration considerations

According to Perry [22], "a firm can be described as vertically integrated if it encompasses two single output production process in which the entire output of the upstream process is employed as part or all of the quantity of one intermediate input into the downstream process; or the entire quantity of one intermediate input into the downstream process is obtained from part or all of the output of the upstream process". The decision to vertically integrate involves the replacement of a supply network function over which the brewery managers have limited control internally [16]. In doing so, the respective function then forms part of the responsibility of the managers in the firm. In the context of craft brewing, vertical integration may sometimes not be considered due to resource constraint but there may be a few areas available where the output of the craft brewery is partially employed in the downstream distribution or supply chain network that is managed by the craft brewery organisation. In a study conducted in the United Kingdom, over 80% of the craft brewers sold all their beer within a 65 kilometre radius of the brewery [23]. In the same study, it was also found that around one in five craft breweries had either acquired or leased at least one pub for the sale of beer produced from their craft brewery. It appears therefore that craft brewers are open to the acquisitions of pubs or restaurants where their beer is sold. When considered as part of the overall manufacturing strategy, the decision to vertically integrate may be an important one for craft brewers to remain competitive and other avenues of vertical integration may be a possibility to explore.

2.3.3 The theoretical framework applied to breweries

The theoretical framework presented shows the elements of manufacturing strategy to be considered in a manufacturing firm. It is however not plausible for all of these elements to be made priority for the success of craft breweries given the limited resources available to implement. The framework can be used by manufacturing firms to assist in quickly determining which objectives are to be prioritised to improve operations. Figure 2-3 shows how the conceptual framework is applied in the commercial brewing industry to identify immediate objectives for improved brewing based on the successes of companies such as South African Breweries.

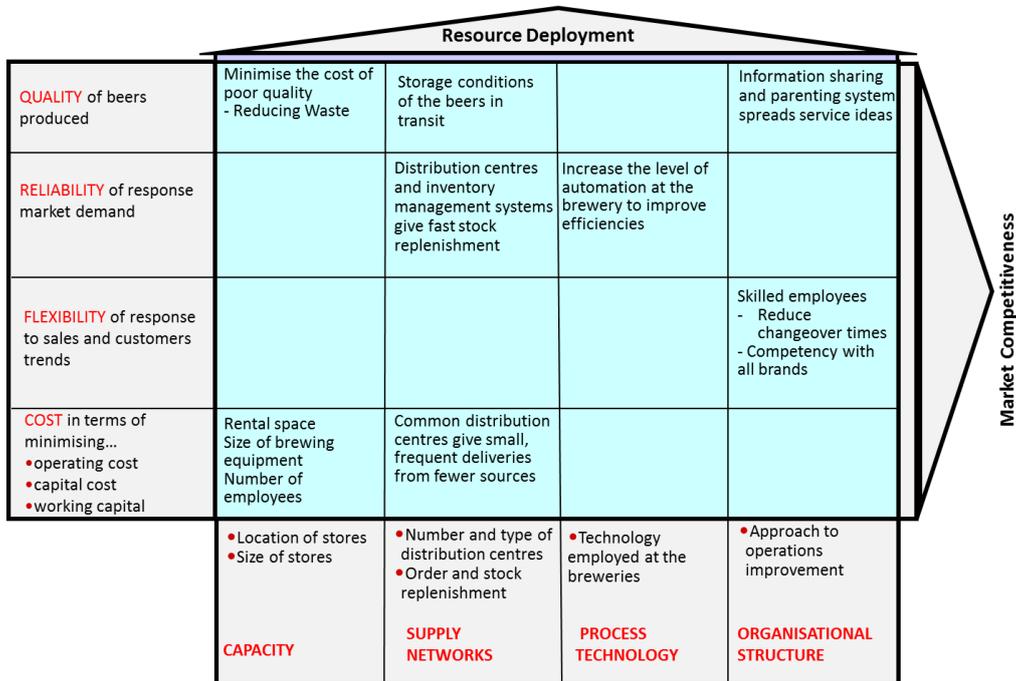


Figure 2-3: Manufacturing strategy framework applied to breweries [9].

2.3.3.1 Resource deployment

Manufacturing strategy is executed at different levels of an organisation and depending on the size of that organisation, this can involve one person or several people. In the case of craft breweries, it is expected that this execution will be carried out by relatively few people. Using the 'resource-based' view of strategy helps decision makers in manufacturing strategy identify resources that may lead to sustainable competitive advantages in the areas of quality, cost, flexibility and reliability and how those resources may either be acquired or developed internally [24].

2.3.3.2 Market Competitiveness

The pursuit of market competitiveness involves selection of resources to develop within the firm and decision how to accumulate them. Firms have to decide how to deploy their unique resources in order to fully realize their potential rents [25]. The consideration of the different deployment alternatives requires firms to fully exploit the potential rents associated with their valuable assets.

3 RESEARCH METHODOLOGY

3.1 Research methodology/paradigm

The chosen method of study includes descriptive and quantitative approach to answer the exploratory research question. The literature shows that the fundamental principle of mixed methods research is that multiple kinds of data can be collected with different strategies and methods in ways that reflect complementary strengths and non-overlapping weaknesses, allowing a mixed methods study to provide insights not possible when only qualitative or quantitative data are collected [28]. The strength of the qualitative method component in this particular case being that craft brewers may tend to have their story that have a similar timeline which would not necessarily be elicited by quantitative method component. Also, to understand in-depth whether craft brewing has had an impact on commercial brewing would require some understating of several indicating variables that can be objectively measured by quantitative analysis.

3.2 Research methodology design

The study intends to complete a survey using a semi-structured questionnaire on consumers that indulge in the experience of craft brewing and consumption of craft beers. A separate survey targeting craft brewery owners or managers will be used investigate a large variety of factors and relationships and how they influence each

other, or in a scenario where no basic fundamentals exist to show which factors and relationships are more important such as the process of manufacturing strategy [29].

3.3 Population and sampling

A minimum of 400 respondents to the survey were targeted as individuals who indulge in beers. These individuals were selected conveniently (see elaboration below) in Gauteng, Western Cape and Kwa-Zulu Natal cities and formed part of the sample that represented the population. The population itself comprised of South African alcohol consumers over the age of 18. It is suggested in the literature that where the population exceeds 1 million individuals, a sample of over 380 will be sufficient to draw reliable conclusions [30].

At least five (5) craft breweries owners or managers were approached to complete the survey. The required permission from the said owners was sourced accordingly for participation.

Convenience sampling was used because questionnaires were distributed to consumers that were found at a specific location. Sampling units were selected by virtue of being at a specific place at a specific time where the surveyor had been located. The surveyor was during the course of data collection placed at different premises of alcohol sale and consumption areas where the target population was most likely to come. Of the total sample obtained, 259 (62.6%) were male and 155 (37.4%) female, fairly similar to Brooks [31] findings in USA. 179 (43.2%) respondents were in Johannesburg, 118 (28.5%) in Cape Town and the balance of 117 respondents (28.3%) from Pretoria, Durban, Vereeniging and Rustenburg. Similarly, convenience sampling was used for the selection of craft brewery owners selected to participate in the study. They are selected due to the geographic location of being close to Gauteng Province which is within reach of the conveyor. This method has some shortcomings in that not every South African alcohol consumer has an equal chance of being selected for participation. The rationale and advantage of such an approach is that it will save time and other resources that are not available for the research to be completed. Consequently, inference to the entire population using the results of this study must be cautiously done.

3.4 Ethics clearance

Ethical clearance that guides how participant information is to be protected and how consent from participants will be sort has been obtained from the University of the Witwatersrand, Johannesburg. A copy of the ethical clearance is available at the school.

4 RESULTS

4.1 Consumer results

24.9% (or 103 respondents) thought that craft beer was “very expensive” while 72.0% thought that craft beer was “expensive” compared to other beers. Only 2.9% (or 12 respondents) thought that craft beer was comparable with other beers when it comes to price per unit.



Figure 4-1 shows the perceived quality of the craft beers and price per unit compared to other beers.

In terms of accessibility 48% of the respondents had poor access to craft beer and a further 43% believe that craft beer is generally inaccessible. The remainder of the respondents had generally good (5%) and “ok” access to craft beers. On the issue of quality of craft beers, 46.4% (192 of the respondents) thought that the quality of

craft beers is not consistent compared with other beers, while 5.8% (24 of the respondents) believe craft beers have a poorer quality in comparison to other beers. The balance of 47.6% (197 respondents) believe that the quality is comparable with that of other beers.

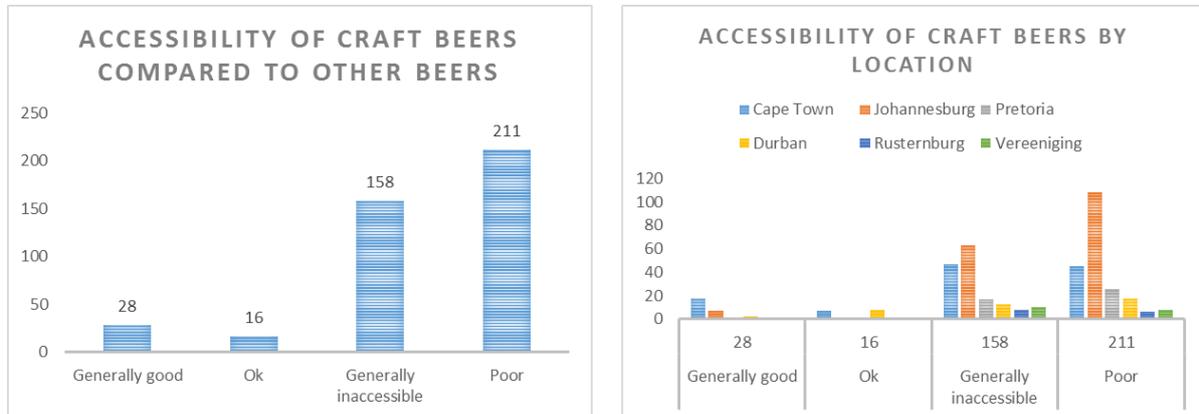


Figure 4-2 shows accessibility of craft beers in the market as reported by consumers.

4.2 Craft breweries capacity and capabilities assessment

The capacities of the responding breweries were studied and the results were such that Craft Brewery A at current production levels of 250 000 litres of beer per month had massive capacity compared with the rest of the other breweries.

The other breweries had much less capacities with current production levels ranging from 9600 litres per month to 32 000 litres per month. The capacity of a brewery is determined by the size of each batch that can be produced by the brewery and complemented by the processing equipment and the quantities of human capital operating the equipment that is currently in the employ of the craft brewery. Out of the five breweries, only Craft Brewery E was running at full capacity compared with the design capacity. Craft Brewery D was running at 40% of design capacity, Craft Brewery B at 80% capacity and Craft Brewery C at 76% capacity.

Of the five craft breweries three of them had been in operations for 3 years, namely Craft Brewery B, C and E. Craft Brewery A has been in operation for one year and Craft Brewery D for only half a year. It must be noted that these numbers represent the time since the first saleable product was commissioned and that planning of the operations started years earlier for all the craft breweries.

4.3 Determination of size and location

The pattern of decisions regarding the choice of equipment sizing to determine the overall size of the manufacturing facility were studied. All the craft breweries that responded had a variety of reasons that were considered when determining the final size of the manufacturing plant and its location.

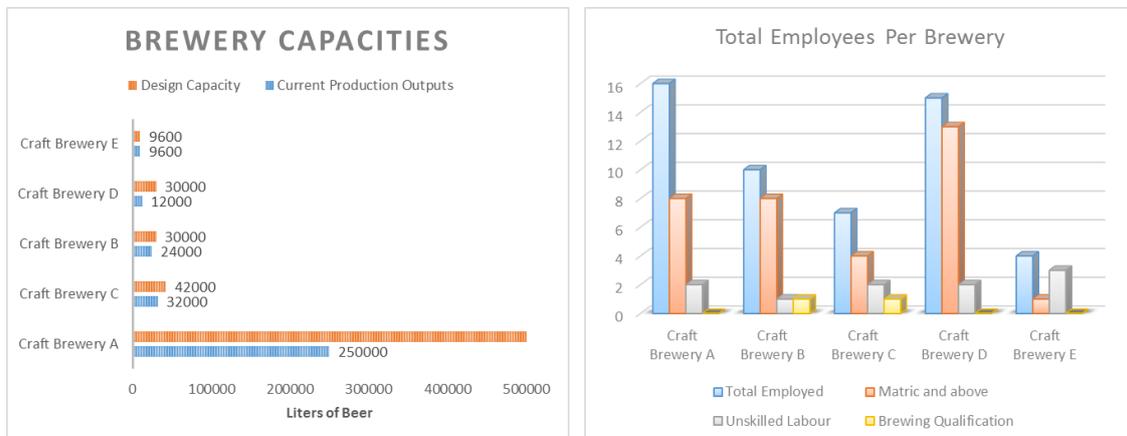


Figure 4-3 shows capacities of each brewery and number of employees at each brewery and their respective skill level that responded to the survey.

The smaller firms in the case of Craft Brewery B, C and E were largely influenced by affordability of the equipment that was required and the affordability of the space that was to be used as the location of the plant. The larger firms in Craft Brewery A and D were largely influenced by the market size they wanted to reach. In terms of staff, Craft Brewery A employed the most employees at 16 followed by Craft Brewery D at 15. Craft Brewery B brewery employed 10 personnel; there were 7 employees at Craft Brewery C and a total of only 4 employees at Craft Brewery E brewery. Only Craft Brewery B and C had a person with previous brewing experience as well as brewing qualifications with previous careers at a large commercial brewery.

4.4 Process technology decisions

The type of process technology employed at each facilities was recorded as follows:

Craft Brewery A: The brewery is mostly automated at approximately 80% automation of all activities that go into brewing the beer. The plant is divided into the brewhouse facilities that largely handles hot product from the cooking process. This is followed by the cellars area where the actual fermentation and maturation of the beer takes place. The filtration and bottling plant then follow. The supporting facilities such as the refrigeration plant, water treatment and heating plant are all fully automated. The cleaning component of all the product handling equipment are fully automated.

Craft Brewery B and Craft Brewery D: Both are about 50% automated with the rest of the brewing activities completed manually by the brewing operators. In both cases cleaning of the beer handling facilities is manually undertaken by the operator. To this extent, some consistency of achieving the same amount of cleanliness is reduced. The supporting facilities such as the heating plant, refrigeration plant and water treatment are all handled automatically.

Craft Brewery C and Craft Brewery E: At these two breweries, there are more manually completed brewing activities than automated ones. Only activities that cannot be performed by an operator are automated such as the heating plant and refrigeration plant. The cleaning of the plant is manually completed by the operators. Most of the beer transfers between different stages of the process are also manually handled.

4.5 Vertical integration consideration

Some of the breweries that responded were found to have considered vertical integration to some extent in making decisions regarding risk, product quality, the cost structure of the brewery and the degree of focus of the organisation.

Craft Brewery E: Has had no thoughts of vertically integrating any part of the supply chain given the brewery's relatively small size in terms of quantities of beer produced. Raw materials such as malted barley and hops are largely procured through SAB Ltd. Distribution is outsourced to a company that specialises in this field. There is no on premise sales licence for beer to be drunk on site and the location of the brewery is in an industrial area.
Craft Brewery C: Its major raw materials are sourced from SAB Ltd and packaging materials are sourced from Console Pty Ltd and Coleus Pty Ltd. Approximately 30% of the beer made out of this brewery is sold at a

restaurant which is a sister company of the brewery. Also, about half of the beer made from the brewery is contract brewing. This means that customers in essence rent out the facility to produce their own beer which they will market, distribute and sell completely separately from the brewery.

Craft Brewery B: Similar to Craft Brewery C, its major raw materials are procured from SAB Ltd and packaging materials are also sourced from large corporations such as Coleus and Console. A large quantity of the beer produced here is sold in kegs which are re-usable. In the past, the brewery has tried to distribute internally but found it practically impossible to distribute reliably as demand increased. The distribution was later outsourced. A small percentage of the beer is sold through the beer garden that is on the same premise as the brewery. The location of the brewery is ideal for such an arrangement. The brewery is currently considering opening sales outlets in and around the local area that will exclusively sell products from the brewery. This requires large capital investments and is currently on hold.

Craft Brewery D: The decision was deliberately made to have international option for the supply of brewing raw materials like malted barley and hops. This gives the brewery a differentiation option as well. The brewery has invested resources in developing an in-house restaurant and beer garden where currently most of the beer is consumed. This decision means that beer does not have to be packaged and thus saves cost accordingly. The brewery has no intention to do contract brewing at this stage as this would take away focus from developing its own brands.

Craft Brewery A: Given issues previously experienced by the company regarding quality of supply of the raw materials, a decision was made to source raw materials from outside South Africa. Negotiations resulted in the ability to match prices for raw materials procured outside to be similar to raw materials in South Africa. The brewery was built to a relatively big size on the basis that it will do mostly contract brewing in addition to in-house brands. While the intention was not to own the distribution part of the operation, it was decided very early on to partner with a sister company in this regard. As a result there is better control of costs involved with the distribution part of the operation. Currently over half of beer produced here is brewed under contract brewing and the rest constitute in-house brands.

4.6 Quality assurance systems

The study investigated the quality systems that have been put in place at the responding craft breweries and found as follows:

Craft Brewery A and D: Consideration for quality is extensive as proven by investment in a quality analysis laboratory on site. A laboratory in breweries is required to be provided and maintained at the plant site with the necessary equipment and supplies for conducting quality control testing. Automated instrumentation have been installed in the process to track quality continuously. Every batch that is packaged is tasted by experienced tasters to analyse how consumers may react to the product. An extension to this is further analysis of the product in trade when the life of the beer is expected to deteriorate with time. Craft Brewery A site is a certified ISO 14001 site which is a standard for operation like craft breweries and allows for regular health and safety audits to be completed on site. Craft Brewery D is planning to be ISO certified site in the near future and thus putting all the systems in place that are required.

Craft Brewery B, C and E: There is no on site laboratory facility as this is not considered a requirement. Basic instrumentation are used to analyse some quality parameters however these are not continuous monitoring instruments. Tasting of every batch of beer packaged is completed on site before it is dispatched. The sites are not accredited with any quality certification authority and thus no regular site inspections are done to test systems that have been put in place for conformance to quality. In the specific case of Craft Brewery D and E, there is no follow up with quality in trade as the general belief is that the beer will be consumed in time before its "best before" time elapses.

All sites claim to have some form of quality system in place where analyses are performed at a predetermined rate and results are recorded. This however can only be verified by a valid accreditation by a relevant authority.

5 DISCUSSION OF RESULTS

5.1 Quality of the craft beers

The survey asked respondents about their impression of craft beer quality in which 52.2% of the response was that the quality of the craft beers tasted or drunk by them were not consistent or were poor. While no literature

could be found to compare these results, this is a very low satisfaction rate with quality by consumers of craft beers. It is worth pointing out that there are costs associated with failure to meet the requirements and expectations of the consumer which could include the consumer declining to use or consume the product again and in the case of craft beer this could mean the consumer opts to try alternative beers.

With regard to quality assurance systems, only Craft Brewery A had all the systems in place for the management of quality in response to the survey questionnaire. The other four breweries that responded had a mix of some quality assurance systems in place but not all. This may potentially leave a gap where quality issues are not identified and corrected. All these issues that are not resolved will in time filter through to the consumer and be reflected in the consumer's perception of the quality of craft beer.

Only Craft Brewery A and D currently have an on-site laboratory for this analysis which forms the foundation of understanding every batch of beer that is produced. The other breweries having no laboratory facilities means they are not able to have an in-depth understanding of the products that they make. The finding of this study is that there is a clear requirement for a set of decisions to improve the quality front of beer production at the craft breweries.

5.2 Unit cost of craft beer

To control the external cost influencing factors that are key inputs to the craft brewery relates to the management of key stakeholders such as suppliers and vendors. The competitive approach suggests that the development and usage of multiple sources for most or all key materials inputs to the brewing of beer will result in lower negotiated prices as suppliers are made to bid against one another. To this regard, the five responding craft breweries have indicated that they are largely dependent on SAB Ltd for all their malt and hops purchases. This is contradictory to the pattern of being competitive, as this is a sole supplier and requires a new set of decisions to be made regarding the sourcing of key materials for the manufacturing plant. Only Craft Brewery A indicated a move away from being dependent on a sole supplier for these two key raw materials to the brewing process. This decision by Craft Brewery A was primarily made for differentiation and to strengthen the supply of these materials but not necessarily to reduce cost.

Other patterns of decision that have a direct bearing on the price that the consumer will eventually pay for craft beer are internal to the craft brewery and include but is not limited to the quantity of labour employed to make a unit of beer and improvement on the cost of quality. Decision patterns that are related to these parameters must be made based on a clear understanding of how these impact the total cost of manufacturing.

5.3 Accessibility of craft beer

There are many variables that affect the accessibility of craft beers in the market and the single most important one of them is the size of the facility built to produce sufficient quantities of beer as per the demand from the market. Under the circumstances of uncertain fluctuation of market demand, the degree of matching between production capacity and customers demand can affect the cost and the efficiency of making beer available to the market.

The primary influencing factor for accessibility of beer to consumers is how the beer is packaged and taken to markets [26]. The majority of the craft beer is served in kegs and therefore not available in convenient packs made available to the consumers through conventional market channels such as the 330ml bottles and cans. Craft Brewery A was found to be the only brewery that sold these convenience packed beers and thus able to take their beers into convenience stores and other places where consumers can buy and take the beers to any place they prefer. The other craft breweries largely sold their beers in kegs which limited the reach of the market to places where alcohol is consumed in-premise.

5.4 Vertical integration considerations

The response by the craft breweries owners indicated that some thoughts towards vertical integration had been entertained. Given the relatively small sizes of the craft breweries, the power to consider backward integration on the raw material side is close to zero. This means that all the craft breweries in South Africa have to rely on SAB Ltd owned Malting Plant to buy malt from or else face the increased costs of importing malt from market overseas, which will significantly increase the costs of manufacturing.

Respondents to the research questionnaire reveal several challenges. Craft Brewery A and Craft Brewery C in particular in their response to the relationship with raw material suppliers, pointed out that the quality received

from the only supplier in South Africa is inferior at best and poses a risk to the quality of their products. While Craft Brewery A was then able to move on and negotiate prices of raw materials out of South Africa, Craft Brewery C, similarly to other breweries that responded, did not have the resources to do so.

5.5 Current strategy shortfalls

Performance objectives that are directly related to cost and quality proved to be the area where most decisions were deliberately made. Most of the craft breweries studied delay investment in expensive equipment that are customary in the brewing industry at the early stages of their operations. Obtaining adequate access to capital has been proven to be one of the biggest hurdles to starting a new business and growing facilities that are already in production [27]. Financial constraints is an issue for flexible solutions to all challenges, ranging from product development problems to production problems [28]. In setting up their organisation structures, the craft breweries must develop an understanding of the requirements of the operations and job designs that will focus on understanding the roles of all resources including personnel. An optimisation of all these resources can be done but must cover all the responsibilities that are to be performed by personnel in order to deliver against the manufacturing strategy. Brewing beer requires not only very specific equipment but also very specific human resource skills to understand all the inputs and outputs of the manufacturing plant.

For Craft Brewery A, B, C, D and E:

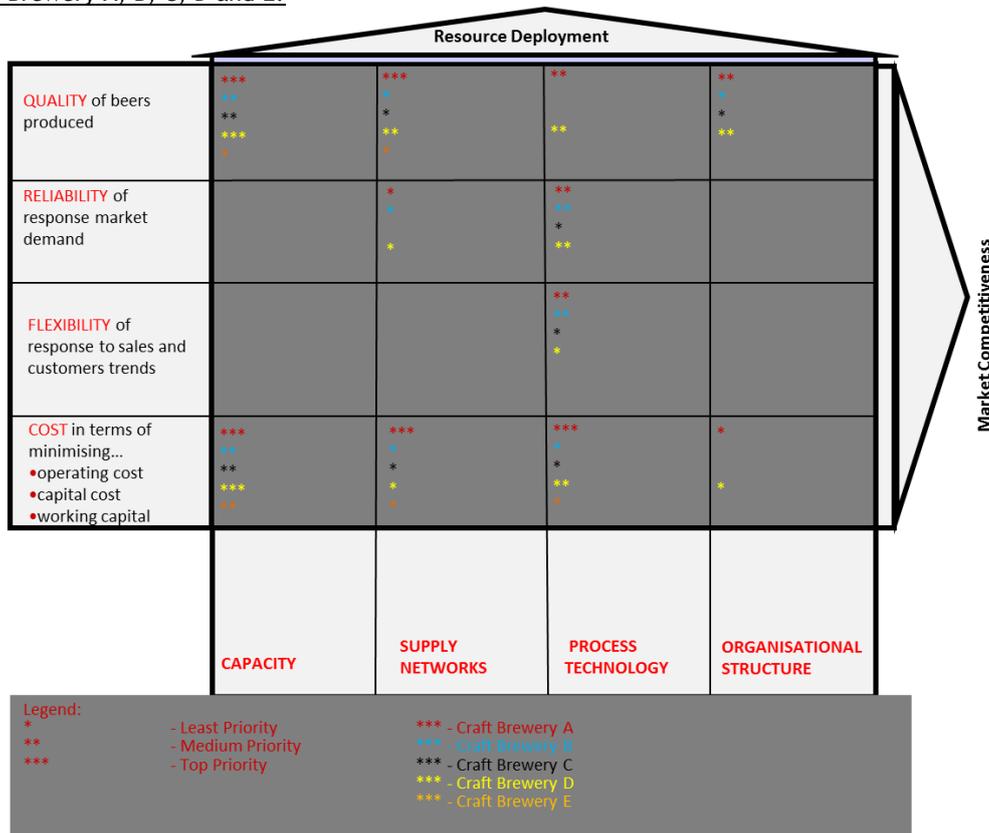


Figure 5-1 Combined Craft Breweries fit to the manufacturing strategy conceptual framework

For Craft Brewery A:

- Cost of brewing capacity - Given that this is the largest craft brewery, there has been significant investment on the capability to achieve economies of scale.
- In-house quality assurance - Craft Brewery A has an onsite laboratory equipped with the relevant brewing equipment to analyse and monitor quality.



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- Product quality in transit - Craft Brewery A has developed a networking relationship with a distributor from a sister company that can be managed and monitored to keep the integrity of the beer while in transit.
- Process technology deployment - Craft Brewery A employs process technology on site and up to 80% of the brewery has been fully automated.

For Craft Brewery B:

- Cost of brewing capacity - The capacity of the brewery is approximately 32000 litres per month which is large compared to others. Significant investments into acquiring the large equipment were made as part of the decisions regarding size incurring some investment costs for capacities.
- In-house quality assurance - The required facilities have not been put in place such as an in house laboratory and all the quality analysing instrumentation that comes with it.
- Process technology deployment - At 50% approximate level of automation of all the tasks of the production, Craft Brewery B has invested in some process technology.

For Craft Brewery C and D

- Cost of brewing capacity - The equipment in the brewery was bought mostly second hand and thus capacities were limited to the existing size of that equipment. Decisions on plant capacities were thus largely based on the cost of procuring the equipment instead of designing fit for purpose equipment as per the market demands that were perceived.
- In-house quality assurance - The craft brewery owner is the main driver of quality with no major investment in quality monitoring process technology employed. Sensory analysis of quality is the main way of final check of batches of beer before they are shipped of site.
- Process technology deployment - A large proportion of tasks at this brewery are completed manually by operators. There has not been any deliberate intervention of automating sections of the brewery for cost, quality and reliability of beer production.

For Craft Brewery D:

- Cost of brewing capacity - Craft Brewery D is running at 40% of design capacity of approximately 30 000 liters per month output. The investment into the size of the brewery has been made already and now the work will be to increase production based on the market demand.
- In-house quality assurance - Accreditation is a commonly used quality management method and the focus from Craft Brewery D has been to comply with outlined process.
- Process technology deployment - To insure batch uniformity and integrity of product through each of the process, Craft Brewery D is equipped with several in process instrumentation to measure quality.

For Craft Brewery E:

- Cost of brewing capacity - The largest investment made towards the manufacturing operations of Craft Brewery E is the capacity for production.
- In-house quality assurance - The brewery has not invested in laboratory equipment to brewing analysis for monitoring quality.
- Product quality in transit - There are no systems in place to check for quality-in-transit. The products from this brewery do not have an extensive reach and therefore are not kept in transit for long.
- Process technology deployment - Production tasks are mostly completed manually by operators in the plant. There is no automation for the key tasks in relation to cost, quality and reliability of beer production.

6 CONCLUSION

There are various craft brewery attributes that seem to affect whether some or most of the decisions that are made in relation to cost, quality, reliability and flexibility are adequately dealt with in the operation of a craft brewery. Out of the demographic variables that were included in the study, size of the plant had stronger relation with all the decisions that are manufacturing strategy related.

In conclusion, the craft breweries management must understand that a manufacturing strategy must be comprehensive in the sense that it should not only guide long terms decisions that must be made for sustainability but must also provide guidelines for business managers to address the many facets of manufacturing decision making given the constantly changing environment of the brewing industry.

Given that craft breweries are in essence SMMEs identified by the government as crucial for the development of the economy, this study will provide guidance to prospective craft brewers and those that are already established in the craft brewing industry by providing some principles on what elements of strategy should be in hand during this phase of market growth.

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