

# **Challenges in Managing Production Capacity by Manufacturing Cooperatives during Growth Stage**

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## **Abstract**

Enterprises, big or small, do experience challenges in managing growth in production. Growth in production requires expansion in production capacity and improvements in resource allocation such as labour and funds. This paper focuses on textile and clothing manufacturing cooperatives based in different townships of the Gauteng City Region of South Africa. These cooperatives produce clothing items. These are regarded as short-life cycle goods and these are also manufactured from short production cycles. Enterprises such as cooperatives move through stages from start-up and then move to the stage of growth. The failure to manage demand during the growth stage for small enterprises results poor quality products, loss of clients and challenges in production backlog recovery. It is against this background that this paper provides an analysis of activities that happen during growth stages of clothing manufacturing cooperatives and points out solutions to these challenges for cooperative directors and practitioners involved in supporting manufacturing cooperatives in developing regions such as South Africa. This paper is based on data collected from n=100 sewing or clothing production cooperatives. Recommendations and directions for future research are provided on this paper.

## **Keywords**

Cooperatives, Growth, Production and Challenges

## **1. Introduction**

The history of cooperative type of enterprises dates back to 1844 when the Rochdale Pioneers Cooperative was established in the City of Manchester in United Kingdom (Abdallah, Bressers and Clancy, 2015). A cooperative is an enterprise set up for mutual benefit of its members and it is collectively owned. It is founded on the principles of self-help, social welfare and empowerment. Cooperatives can be found in different sectors of the economy which in developing countries they are involved in electricity supply, food and clothing production. Cooperatives are viewed as an alternative to conventional firms driven by profit maximization. There are well established cooperative movements around the world which seek to provide advisory services and market entry for individual cooperative enterprises (Kalmi, 2013). A popular cooperative movement and one that has been successful is that of Mandragon which supports cooperatives to achieve growth and become sustainable enterprises in competitive sectors (Delgado, 2014). Cooperative movements or associations are formed to support collective action and advance competitiveness of individual cooperatives through education, training and resource support (Cachioni *et al.*, 2014).

### **1.1 Background to Manufacturing Cooperatives**

Manufacturing cooperatives fall in the category of social enterprises created to produce goods in the interest of communities interested in having ownership for the means of production and control over their produce.

Cooperative membership is voluntary and it is based on the principle of equal democratic right to participate in a cooperative once you are a member. In South Africa the failure rate of cooperatives is 88% based on the statistics that were published by the Department of Trade and Industry in 2012. The highest number of cooperatives was in production of clothes, art work and agriculture. The lack of education among cooperative members and poor governance were described as major reasons for failure and most cooperative members were senior members of society who did not have an opportunity to have quality education in the old South Africa (Wessels and Nel, 2016). Manufacturing cooperatives produce affordable furniture, clothing, fresh agricultural produce and art-work in the context of developing countries. Successful cooperatives provide sustainable welfare for their members (CHRISTOFOROU, 2010).

### **1.2 Understanding Stages of Enterprise Development and Production Cycle**

There are four stages in business development namely; start-up, growth, maturity and decline or rejuvenation. These stages have different characteristics. The start-up stage is when an enterprise begins its trade of a product line. The growth stage is characterised by a growing demand for the products offered and which is followed by an increase in manufacturing capacity. In the growth stage there are risks such as overtrading and investing excessively in developing capacity for an unsustainable demand. It is therefore essential to study the nature of demand and its drivers in order to respond efficiently without creating new risks for an enterprise. Lack of skilled business analysts in small businesses and tools to analyse growth opportunities often lead to failure during this stage due to over-investment into short term demand (Khan *et al.*, 2016). The maturity stage signifies stability in demand and production management of an enterprise. At this stage managers understand quantities and resource allocation to cope with different seasons of demand. Also at this stage internal knowledge systems are well design to interpret market trends and opportunities. A stage which follows maturity is decline or innovation (rejuvenation) which means that an enterprise needs to modify its products and processes in line with the needs of consumers to remain stable in its industry. A failure to deliver an innovative value that responds to the needs of a consumer that might bring an organisation to a point of decline and mainly in sales which impacts production, sales and revenues.

A production cycle follows the same concept of enterprise development stages. In operations management a central discussion about production is the transformation process which entails inputs, conversion and output. This is done on the basis of understanding that there has to be sufficient volumes, variations and value. In a production cycle factors such as cost, quality, flexibility and infrastructure require managerial attention in order to deliver adequately to consumer demands. Production cycles differ by product type and also by industry. There are short and long production cycles varying by industry.

### **1.3 Production Efficiency, Demand and Success of Small Manufacturing Enterprises**

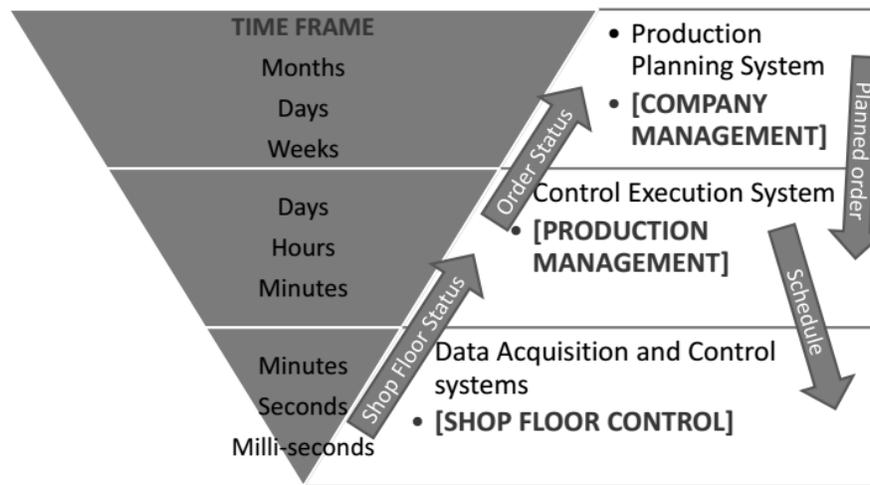
The ability of an enterprise to produce and deliver high value at a lowest cost possible is referred to as production efficiency. In order to attain production efficiency enterprises create systems for resource allocations and criteria for opportunity evaluation. In order to serve product demand high levels of integration are required in terms of supply chain, production flows and general distribution. High demand of a product requires fast response in order to build consumer confidence and make it hard for competitors to have the unsatisfied consumers. Small enterprises such as manufacturing cooperatives need to also balance their social values based on their reason for existence this means ensuring socially compliant products and welfare of the workforce (Tuominen *et al.*, 2017). In driving production growth and managing it cooperatives are also expected to balance it all with the triple bottom line which entails fulfilling environmental, economic and social compliance expectations (Tham and Muneer, 2013)

### **1.4 Problem Investigated**

Education in South Africa's cooperatives is a challenge and many cooperative members have not had an opportunity to have extensive education in management, operations and production (Winn, 2015). Members of South African cooperatives depend on their knowledge they gained working elsewhere. Their reasons to establish cooperatives were also informed by trade unions and other political movements which sought to support those that lost employment due to retrenchment and closure of companies they worked for; this was done with less consideration of the education of the cooperatives' members (Delgado, 2014). South African cooperatives get support in a form of financial and non-financial resources from various stakeholders including the department of Trade and Industry. The problem can be described as the limited ability to cope with high levels of seasonal demand in production by clothing cooperatives due to lack of adequate intellectual capital and the inability to interpret opportunity demands. The following sections are the literature review of this study and it is followed by a section on research design which explains the research protocol.

## 2. Literature Review

In manufacturing and production intensive organisations product time-to-completion prediction models are used to determine production efficiency (Matt, Rauch and Dallasega, 2015). These models include neural networks and manufacturing execution systems (MES) which integrate manufacturing planning activities from management, operations control and factory floor level (Chang, Kong and Yin, 2015). Management is responsible for long, medium and short term organisational planning which is based on financial and market performance objectives (Siu, Fang and Lin, 2004). On MES the second level is operations strategy management that is responsible to ensure efficient deployment of resources to meet the production needs and to reduce time-to-completion for orders (Angelus and Porteus, 2002). The factory level is responsible for producing the required products within the given time period and specifications applying skills as well as infrastructural resources (Fox, 2016). MES activities are illustrated on the diagram shown below.



**Figure 1 Function model of MES** (Chang, Kong and Yin, 2015)

The MES model of managing production and associated information about shop floor status, schedule, planned orders and order status is instrumental in managing dual demand (Berbain, Bourbonnais and Vallin, 2011). The evolution and ever-changing consumer expectations require flexible production practices as well as an ability to manage supplier relationships to make timely decisions to prevent over production (Chang, Lin and Chen, 2015).

### 2.1 Factors in production management

There are primary contributors to production management which enable a manufacturer to deliver the promised product. Production facilities play a key role in housing workers, machineries and all associated infrastructural technology (Harms, Fleschutz and Seliger, 2010). Product life-cycles impact on the production management style that an organisation adopts such as that short period life cycle requires changes in factory production lines, supplier changes and re-skilling of labour; and on one hand long production cycles require studies on their carbon foot print for purposes of compliance (Yan, Humphreys and Holden, 2013). Carbon footprint is considered in line with the triple bottom line responsibility of ensuring sound and sustainable ecological practices, economic benefits for all and social contribution of the manufacturing enterprise through its products (Gmelin and Seuring, 2014). The theory of constraints serves to remind managers and practitioners of the realities of resource scarcity during pre-to-post production stages; this resource is often reliable data about customer preferences and reliable quantities of predicted product demand (Koh *et al.*, 2017).

### 2.2 Factory workers and community: additional factors to production management

The production and manufacturing landscape has changed from primarily focusing on machines and other techno-infrastructural resources only, but focuses also on human aspects of production activity (Matt, Rauch and Dallasega, 2015). Production growth refers to demand appreciation and increase in sales orders for an organisations product or service which in turn increases direct sales revenues for an organisation (Kituyi, 2004). In factory working conditions that are not safe, ergonomically standard and open to multi-stakeholder suggestions the performance of

employees is likely to decrease and affect any production growth potential (Tighe, 2016). Garment production is generally labour intensive by process design and by sectoral economic standards of sourcing cheap labour in textile sectors which creates tensions for some organisations and impact negatively their production growth (Perry, Wood and Fernie, 2015).

### **2.3 Literature summary and linkages**

The above literature review is based on production management practices using the MES model and it states factors which impact on manufacturing growth in small scale firms. Small scale enterprises begin operations in manufacturing settings and from inadequately resources factories from which they establish resource and market access (Schure *et al.*, 2013). Communities that embrace cooperatives tend to organise production of basic products to be made within their reach which creates vulnerability to external producers of similar goods (Smith, Hudson and Schreckenber, 2017). Community based manufacturing cooperatives employ lean practices in organisational processes which help reduce costs of gaining access to means of production and high tech labour skills (Videla, 2006). In worker-owned manufacturing cooperatives there are decision systems of managing and coping with production growth which includes empowering labour to make decisions in their line of work as long as it ensures efficient delivery of production targets (Jayawardana and O 'Donnell, 2009). In these community based manufacturing cooperatives the business environment is fragile and it is sustained through social interests of those involved by sharing efforts and purchasing their local products (Fox and Mubarak, 2017). The following section is research design.

## **3. Research Design**

The inquiry of this study is quantitative and is derived as part of a bigger study conducted from the years 2015 to 2017 on the impact of funding on cooperatives in the Gauteng City Region of South Africa. This paper presents a specific section of the study on managing growth in production using statistical data which was collected (Welman and Kruger, 2001).

### ***Administration of questionnaires***

A total of n=100 questionnaires were administered with the leaders of cooperatives in clothing manufacturing. The initial study reached only 80 cooperatives however, in pursuit of managing growth in production an effort to reach a further 20 other cooperatives was made hence this research paper. A total of 15 questionnaires were piloted to test the instrument and its ease of administration. The questionnaire took 15 minutes to complete in person by a cooperative leader and it took 25 minutes to be completed telephonically. All the questionnaires in the interest of reducing costs in visiting cooperatives were telephonically administered asking all questions on the questionnaire. Appointments were made with respondents for the telephone sessions in the interest of avoiding disruptions and any altercations during calls.

### ***Ethics and validity of the study***

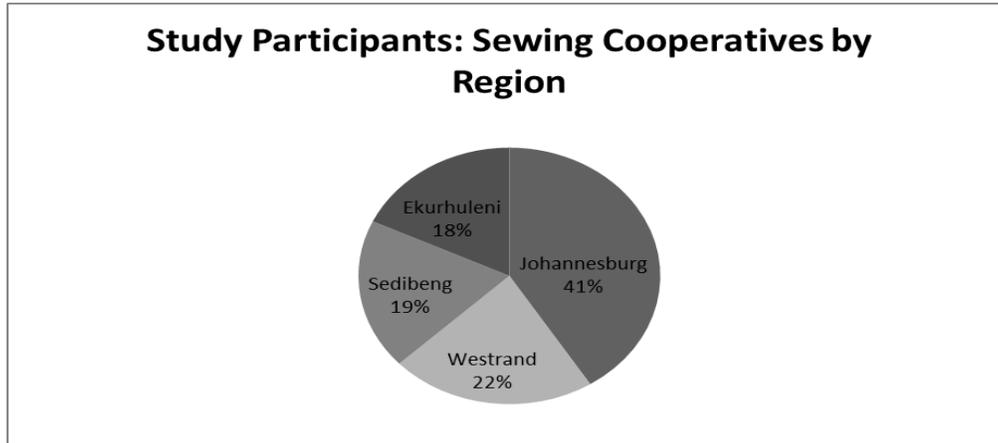
The study was granted a permission to be conducted by the Gauteng Department of Social Development and also from the University of Johannesburg by the research study supervisor. This was to ensure that participants are not exploited in any way when the questionnaires are administered and when the information is used (Thorpe and Holt, 2008). The academic purpose and confidentiality of any personal or business information collected was declared upfront (Moutinho and Hutcheson, 2011). The information collected from the study in the interest of the ethics of beneficence was also ploughed back into the training sessions of cooperatives as part of an ongoing manufacturing cooperatives development project which culminated from the bigger research study in which this one was derived from. The questionnaire used in this study was tested for reliability and statistical validity. In reporting results frequency tables are used and correlations are presented with clarity.

### ***Research value and addressing the problem***

This research has immediate value as it can be used in training of cooperatives engaged in manufacturing contracts and those that receive funding for manufacturing purposes. Cooperatives seek to achieve growth and to be competitive as business enterprises. In order to achieve this they aim to attract big contracts and generate profitable revenues. This paper can help address the problem of managing growth in production once a manufacturing cooperative has been able to attract a large-scale production contract. Graphical and tabulated presentations are provided in the findings and results section.

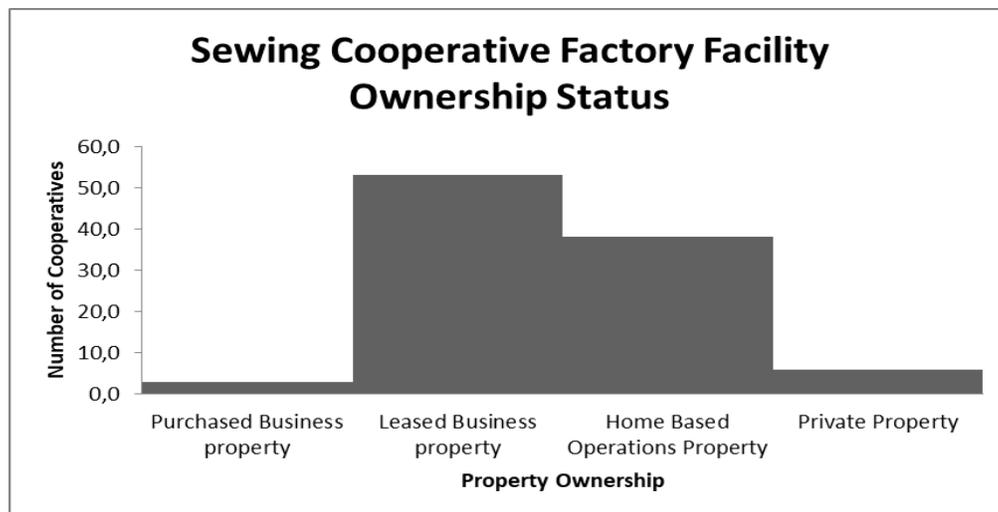
#### 4. Findings and Results

The problem area investigated in this study is the challenge of clothing manufacturing cooperatives in coping with production growth and increased short-term demand in a resource constrained factory or production environment. This study focuses on cooperatives in the Gauteng Province of South Africa. A majority of the cooperatives that participated was a 41% based in the City of Johannesburg, followed by 19% in Westrand, 19% in Sedibeng and 18% in Ekurhuleni. This information is depicted on the figure below.



**Figure 2 Participant Cooperatives per Region**

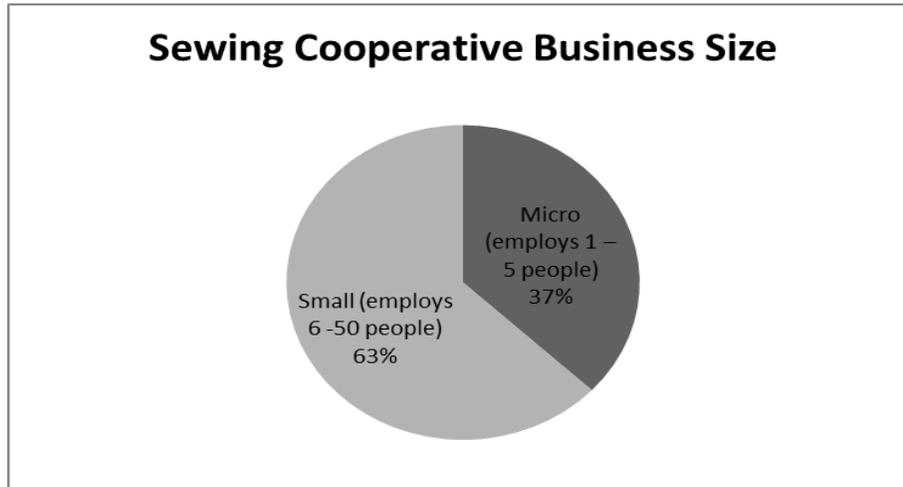
Sewing cooperatives obtain contracts from government departments, private enterprises and from the general public. These are mainly orders for sets of garments and also corporate clothing. High demand is often affected by resources and production facilities. Over 50% of the sewing cooperatives operate from leased properties and this is often a challenge in seasons of low demand where the cost of lease outweighs revenues generated. Home-based cooperatives also get challenged when production demands are high in a small work-space. Only 3% of the cooperatives have purchased property and which is an essential means of production. Private property refers to that which is offered by private companies in support of cooperatives in their communities of business operation. This kind of property access enables cooperatives to focus on their core business with less concern in dealing with property related issues.



**Figure 3 Factory Facility Ownership Status**

There are two categories in which the sewing cooperatives can be classified into. In this research 63% of the cooperative are small in size and they employ only between 6-50 people which includes members of the cooperative and the micro sized cooperatives (37%) work with only members which is between 1-5. The size of the cooperatives

determine their ability to cope with rapid production growth and the growth-seeking behaviour is influenced by their size.

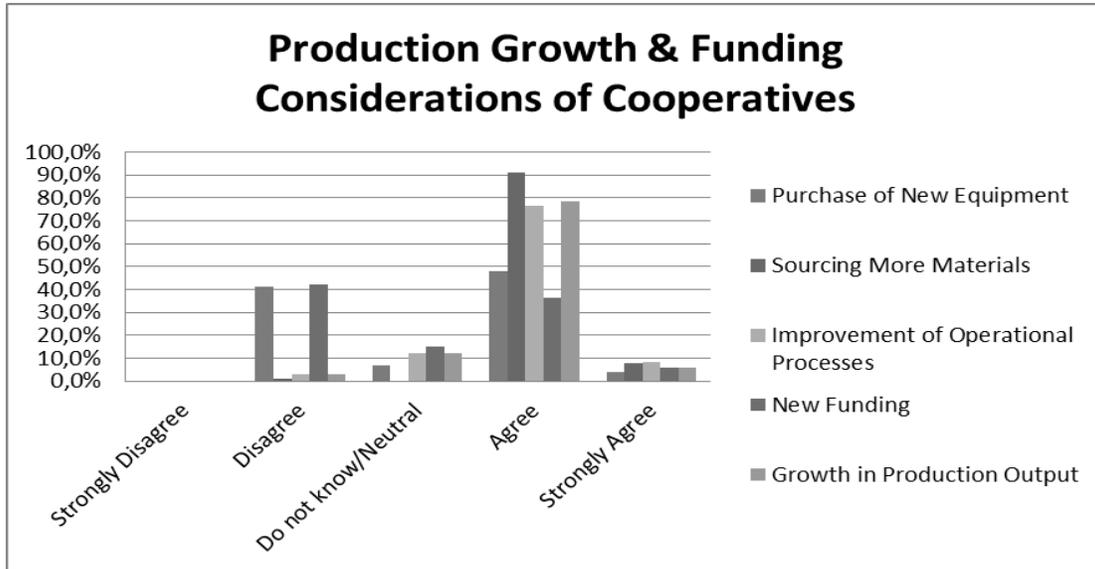


**Figure 4 Sewing Cooperative Business Size**

The sewing cooperatives are contracted in a funding programme run by the Gauteng Department of Social Development which enables distillation of knowledge and distribution of resources to the cooperatives in the clothing production sector. Cooperatives get evaluated by a dedicated team from the department, when they pass the assessment they receive an order from the department to make school uniforms and the order comes with a cash deposit to enable cooperatives to source relevant materials. This project does increase production of cooperatives and its intensity is felt by cooperative members who work extra hours due to resource constraints such as limited machineries and small factory space. The following figure shows key numbers about the funding deposit that enables the cooperatives to cope with rapid intensity in managing short term high production growth and demand. The responses of the cooperative members entail the following:

- A total of 40% of the cooperatives could not purchase new equipment from the funds and revenues generated from the social support project of the Department of Social Development. This is evidence that short term financing resources are not always sufficient to support purchases of resources such as machinery besides buying consumables such as cloths and textile.
- A further 42% of cooperatives also disagree that the contract funding obtained helped them attract new funding from elsewhere. This shows that cooperatives have no focus on funding for purposes of growth and development to cope with rapid short-term demand.
- In direct contrast 60% of the cooperatives that participated in this study have purchased new equipment resources through contract funding from the Departmental initiative. This has enabled them to cope repeatedly with an increased demand for production of local clothing.
- A primary purpose of the advanced cash deposit in the contracting process is to help cooperative source materials and deliver timeously which also increases the buyer confidence. A total of 92% of the cooperatives sourced more materials from the funding and revenues received.
- On the improvement of operational processes such as sewing machine regular maintenance, process layout improvements and delivery procedures the results show that 75% of cooperatives have improved due to accessing advance funding and revenues generated.
- A total of 79% of the sewing cooperatives have generally experienced growth in production output because of having access to funding and their ability to generate revenues.

It remains evident based on these findings that manufacturing cooperatives in South Africa's city region still face challenges in coping with their growth potential. The need to increase demand for their products and promotion of local production is an opportunity that cooperatives can utilize to maximize their revenues. Members, stakeholders and cooperative customers will benefit if cooperatives invest in infrastructure, machinery and skills of members.



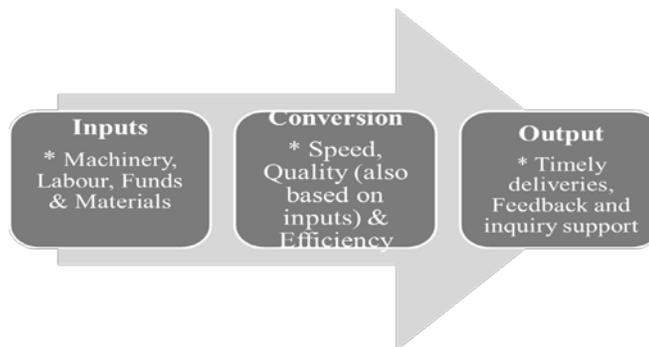
**Figure 5 Production Growth & Funding Considerations of Sewing Cooperatives**

The role of cooperatives in creating access to affordable products is essential in South Africa’s city region of Gauteng and it is a way to address injustices of the past which made it difficult for women, Black people, youth and people with disabilities to be at the forefront of the ownership of manufacturing enterprises. The following sections are discussion and the conclusion.

### 5. Discussions and Recommendations

Clothing production cooperatives play a key role in providing affordable fashion and other clothing items in township and rural areas of South Africa when enabled to do so through support from the Department of Trade and Industry in South Africa. However, the inability to cope with rapid growth is seen in the findings of this study where over 40% of the cooperatives responded that they could not purchase new machines to cope with rapid production demands even when funding has been provided for such to happen. Development practitioners, operations management consultants for cooperatives or those contracted to support cooperatives and academics should take note of the following recommendations about handling the challenges of growth in production:

- **Critical focus points in production growth:** there should be a focus on inputs (machinery, materials, labour and funds) which enable the production process to take place. During the actual making of the garments speed, quality and efficiency shall be taken care of and finally when the output is ready the delivery time should also be considered without creating a set of new problems for the cooperative enterprise.



**Figure 6 Critical Focus Points (Transformation Process)**

- **Secondary cooperative options:** inter-cooperative cooperation is encouraged by the International Cooperative Alliance. This refers to sharing of resources, skills and best practices in managing production growth demands.

- **Demand forecasting:** cooperative will need to begin using methods of predicting and forecasting future demands. This can be done by using previous data on orders and also by observing customer demand trends.
- **Skills to manage production complexity:** cooperatives should be equipped with skills to manage technical elements of production and project management. This will ensure that cooperatives do not compromise on quality, efficiency and put their employees under pressure in an attempt to meet customer demands which were not properly planned for.

Community enterprises such as cooperatives have limited resources and they compete for markets with major corporations which is why it is important for them to manage any growth opportunity with due care and retain their loyal clients.

## **6. Conclusion and Future Research**

In conclusion production growth in cooperatives means direct growth to revenues which are important to sustaining their operational feasibility. Cooperatives are not profit driven, like private corporations, but are focused on democratic values, society and facilitating affordable access to goods and services for their members and community. The clothing cooperatives in South Africa desire growth and this is seen in their investments in production by buying new machinery, sourcing more materials and working with a government department to secure contracts and relevant funding. Improvements on managing the transformation process (inputs, conversion and output) could be implemented by cooperatives by ensuring quality sourcing, speed and acting on customer feedback. Cooperation and support among cooperatives is also essential to consider as they can share scarce resources and facilitate support for resource sharing. Future research could focus on collecting empirical data on the issue of managing growth holistically in a cooperative organisation that is involved in production and manufacturing. This would enlighten small enterprise development practitioners and cooperative leaders to think about holistic production growth management strategies.

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## **References**

- Abdallah, S., Bressers, H. and Clancy, J. (2015) 'Potential electricity co-operatives in Kenya: Could social capital be a barrier?', *Community Development Journal*, 50(2), pp. 213–228. doi: 10.1093/cdj/bsu029.
- Angelus, A. and Porteus, E. L. (2002) 'Simultaneous Capacity and Production Management of Short-Life-Cycle, Produce-to-Stock Goods Under Stochastic Demand', *Management Science*, 48(3), pp. 399–413. doi: 10.1287/mnsc.48.3.399.7726.
- Berbain, S., Bourbonnais, R. and Vallin, P. (2011) 'Forecasting , Production and Inventory Management of Short Life-Cycle Products: A Review of the Literature and Case Studies', *Supply Chain Forum*, 12(4), pp. 36–48.
- Cachioni, M. et al. (2014) 'Motivational Factors and Predictors for Attending a Continuing Education Program for Older Adults', *Educational Gerontology*, 40(8), pp. 584–596. doi: 10.1080/03601277.2013.802188.
- Chang, J., Kong, X. and Yin, L. (2015) 'A novel approach for product makespan prediction in production life cycle', *International Journal of Advanced Manufacturing Technology*, 80(5–8), pp. 1433–1448. doi: 10.1007/s00170-015-7093-3.
- Chang, P. C., Lin, Y. K. and Chen, J. C. (2015) 'A fuzzy-based assessment procedure for a clothing factory with waste-prevention consideration', *Journal of Cleaner Production*. Elsevier Ltd, 108, pp. 484–493. doi: 10.1016/j.jclepro.2015.06.144.
- CHRISTOFOROU, A. (2010) 'Social capital and human development: an empirical investigation across European countries', *Journal of Institutional Economics*, 6(2), pp. 191–214. doi: 10.1017/S1744137409990324.
- Delgado, A. (2014) 'Co-operatives and education in the Basque Country: The ikastolas in the final years of Franco's dictatorship', *History of Education*. Routledge, 43(5), pp. 676–690. doi: 10.1080/0046760X.2014.941420.
- Fox, S. (2016) 'Leapfrog skills: Combining vertical and horizontal multi-skills to overcome skill trade-offs that limit prosperity growth', *Technology in Society*. Elsevier Ltd, 47, pp. 129–139. doi: 10.1016/j.techsoc.2016.10.001.
- Fox, S. and Mubarak, Y. M. (2017) 'Moveable social manufacturing: Making for shared peace and prosperity in fragile regions', *Technology in Society*. Elsevier Ltd, 51, pp. 1–7. doi: 10.1016/j.techsoc.2017.07.003.

- Gmelin, H. and Seuring, S. (2014) 'Achieving sustainable new product development by integrating product life-cycle management capabilities', *International Journal of Production Economics*. Elsevier, 154, pp. 166–177. doi: 10.1016/j.ijpe.2014.04.023.
- Harms, R., Fleschutz, T. and Seliger, G. (2010) 'Life cycle management of production facilities using semantic web technologies', *CIRP Annals - Manufacturing Technology*. CIRP, 59(1), pp. 45–48. doi: 10.1016/j.cirp.2010.03.045.
- Jayawardana, A. and O'Donnell, M. (2009) 'Devolution, job enrichment and workplace performance in Sri Lanka's garment industry', *Economic and Labour Relations Review*, 19(2), pp. 107–122. doi: 10.1177/103530460901900208.
- Kalmi, P. (2013) 'Catching a wave: The formation of co-operatives in Finnish regions', *Small Business Economics*, 41(1), pp. 295–313. doi: 10.1007/s11187-012-9424-1.
- Khan, H. F. . et al. (2016) 'Factors affecting performance of co-operatives in Malaysia', *International Journal of Productivity and Performance*, 65(5), pp. 641–671. doi: 10.1108/09574090910954864.
- Kituyi, E. (2004) 'Towards sustainable production and use of charcoal in Kenya: Exploring the potential in life cycle management approach', *Journal of Cleaner Production*, 12(8–10), pp. 1047–1057. doi: 10.1016/j.jclepro.2004.02.011.
- Koh, L. S. . et al. (2017) 'Conceptualizing a circular framework of supply chain resource sustainability', *International Journal of Operations and Production Management*, 37(10), pp. 1520–1540. doi: 10.1108/RSR-10-2016-0070.
- Matt, D. T., Rauch, E. and Dallasega, P. (2015) 'Trends towards distributed manufacturing systems and modern forms for their design', *Procedia CIRP*. Elsevier B.V., 33, pp. 185–190. doi: 10.1016/j.procir.2015.06.034.
- Moutinho, L. and Hutcheson, G. (2011) *The SAGE Dictionary of Quantitative Management Research*. First Edit. London: SAGE.
- Perry, P., Wood, S. and Fernie, J. (2015) 'Corporate Social Responsibility in Garment Sourcing Networks: Factory Management Perspectives on Ethical Trade in Sri Lanka', *Journal of Business Ethics*, 130(3), pp. 737–752. doi: 10.1007/s10551-014-2252-2.
- Schure, J. et al. (2013) 'Formalisation of charcoal value chains and livelihood outcomes in Central- and West Africa', *Energy for Sustainable Development*. Elsevier Ltd, 17(2), pp. 95–105. doi: 10.1016/j.esd.2012.07.002.
- Siu, W., Fang, W. and Lin, T. (2004) 'Strategic marketing practices and the performance of Chinese small and medium-sized enterprises (SMEs) in Taiwan', pp. 161–178. doi: 10.1080/08985620410001677862.
- Smith, H. E., Hudson, M. D. and Schreckenber, K. (2017) 'Livelihood diversification: The role of charcoal production in southern Malawi', *Energy for Sustainable Development*. The Authors, 36, pp. 22–36. doi: 10.1016/j.esd.2016.10.001.
- Tham, Y. and Muneer, T. (2013) 'Energy co-operatives in the UK', *International Journal of Low-Carbon Technologies*, 8(1), pp. 43–51. doi: 10.1093/ijlct/ctr048.
- Thorpe, R. and Holt, R. (2008) *The SAGE Dictionary of Qualitative Management Research*. First Edit. London: SAGE.
- Tighe, E. (2016) 'Voluntary governance in clothing production networks: Management perspectives on multi-stakeholder initiatives in Dhaka', *Environment and Planning A*, 48(12), pp. 2504–2524. doi: 10.1177/0308518X16660978.
- Tuominen, P. et al. (2017) 'CSR activities in consumer co-operatives: Exploring the case of Finnish S Group co-operatives based on board reporting', *Journal of Co-operative Organization and Management*. Elsevier, 5(2), pp. 108–117. doi: 10.1016/j.jcom.2017.10.002.
- Videla, N. P. (2006) 'It Cuts Both Ways: Workers, Management and the Construction of a "Community of Fate" on the Shop Floor in a Mexican Garment Factory', *Social Forces*, 84(4), pp. 2099–2120. doi: 10.1353/sof.2006.0113.
- Welman, C. and Kruger, F. (2001) *Research Methodology*. 2nd Editio. Oxford: Oxford University Press. doi: 10.3794/johlste.41.res.
- Wessels, J. and Nel, E. (2016) 'A new co-operative revolution in South Africa? Reflections on the outcomes of state support in the Free State Province', *Local Economy*, 31(1–2), pp. 187–203. doi: 10.1177/0269094215621731.
- Winn, J. (2015) 'The co-operative university: Labour, property and pedagogy', *Power & Education*, 7(1), pp. 39–55. doi: 10.1177/1757743814567386.
- Yan, M.-J., Humphreys, J. and Holden, N. M. (2013) 'Life cycle assessment of milk production from commercial dairy farms: The influence of management tactics', *Journal of Dairy Science*, 96(7), pp. 4112–4124. doi: 10.3168/jds.2012-6139.

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