LOCAL FASHION VALUE CHAINS: SUCCESS FACTORS AND COMPETITIVE ADVANTAGES

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ABSTRACT

Globalization had forced fashion companies to move their manufacturing to low cost bases. However, in the recent times several challenges like poor transparency, ethical issues, high transportation costs, long lead times, etc. have motivated major reshoring initiatives. Steadily the fashion companies in the west are relocating back their production and are motivated by trends of greater product customization, supply chain transparency and digital technologies. In addition, several initiatives have been launched to support this development, for example the US initiatives: (TC)2 "Reshoring Fashion Initiative" and "Apparel Made for You". However detailed scholarly discussion on what enables success of such local fashion value chain models are limited. This paper explores the drivers, critical success factors and competitive advantages in designing such local fashion value chains by drawing inferences from a European initiative called "fromRolltoBag". An action research is employed to collect empirical data through observations and interviews with the project stakeholders. Results show that the competitive success lies in designing a consumer-driven, digitally-enabled fashion value chain, enabled by the strategy of differentiation through: (i) advanced digitalization of design and manufacturing operations, (ii) flexible, integrated and agile operations, and (iii) enhanced customer experience/interaction with the extended product-service system.

Keywords: Local manufacturing, consumer-driven, digital fashion, competitive advantage, critical success factor

INTRODUCTION

Globalization and cost advantages in many industries have resulted in large-scale outsourcing of manufacturing to low-cost bases (Kinkel and Maloca 2009, Martínez-Mora and Merino 2014), however resulting in numerous negative effects and risks as well, e.g. increased delivery times, decreased delivery precision, unfulfilled demands, extra inventory, cultural differences and language barrier along the supply chain. Such is true in case of the fashion apparel industry thus affecting the supply chain performance due to long lead times, high forecasting errors, mark downs, lost sales (Mattila, King, and Ojala 2002). Further a number of macro- and environmental factors, like rising offshore wages, job loss in western nations, vis-à-vis growing environmental concerns, demand for faster and greener supply chain, etc. have proved to be major drivers of rethinking manufacturing locations closer to the end customer/consumer thus strengthening the initiative to "bring back manufacturing" near the country of

origin (Ellram, Tate, and Petersen 2013, Kinkel 2014). Numerous drivers, like higher product quality and consistency, skilled workforce, better image of being Made in the country of origin, lower inventory levels, better responsiveness to changing customer demands, minimal intellectual property and regulatory compliance risks, improved innovation and product differentiation have been highlighted in the studies by Kinkel (Kinkel 2014, Kinkel and Maloca 2009). Thus the phenomenon of reshoring has gained widespread attention in the business community and political platform (Tate 2014, Reshoring Initiative 2015). In the fashion apparel industry, steadily the companies in the west are relocating back their production and are motivated by triple bottom lines of sustainability. Several initiatives have been launched to support this development, for example the US initiatives: (TC)2, "Reshoring Fashion Initiative" and "Apparel Made for You".

The existing literature includes much research on manufacturing location decisions and increasing attention towards reshoring, examining factors that reinforce competitiveness in re-shored manufacturing in high cost environments (cf. Ellram, Tate, and Petersen (2013)), however, there is a clear lack of research and insight from a value chain perspective. Rudberg and Olhager (2003) have highlighted that there are distinct differences in key operations strategies and issues underlying success to competitive manufacturing networks and inter-firm supply chains, in terms of focus, direction, extent and balance. For instance, supply chains take a much wider focus on coordinating inter-firm relationships and in balancing collaborative interfaces compared to a narrower intra-firm manufacturing focus. Further, the scholarly discussion on salient factors enabling competitive manufacturing, have mostly analysed them separately without exploring their potential effects to achieve competitive "local value chain" in a high cost environment. Further, Fratocchi et al. (2014) have highlighted that the reshoring phenomenon holds different perspectives in labor-intensive and capital-intensive industries; even though Martínez-Mora and Merino (2014) have studied the reshoring initiatives in the labor-intensive context of Spanish footwear industry, scholarly discussion is still limited in context to retail-dominated industries, e.g. fashion-apparel.

In this context, this paper explores the key drivers, critical success factors (CSFs) and competitive advantages required in designing such "local fashion value chains" by drawing inferences from a European initiative called "fromRolltoBag" (fRTB).

LITERATURE REVIEW

The concept of "local value chain" has not gained prominence in business and supply chain management literatures, except that in cluster and regional development studies. A search with "local value or supply chains" as keywords on Scopus yielded merely 5 and 19 results respectively with most of them focussed towards cluster and regional competitiveness. Grounding our research within the scope of supply chain management we have thus used competitive manufacturing (along with reshoring) as the dominant literature base for review.

Various operations and supply chain related factors have been emphasized separately to reinforce competitive manufacturing in high cost environments, viz. manufacturing location proximity to final market, product customization, flexibility and responsiveness, strategic alliances and networks, manufacturing strategy, role of

automation and information technology (IT), innovation, knowledge, education and skills, etc.

Success of "local value chains" based on competitive manufacturing in high cost environment largely depends upon the close proximity to various stakeholders, particularly the customers and markets to attain market seeking advantages (Ellram, Tate, and Petersen 2013). MacCarthy and Atthirawong (2003) have specified how this proximity induces speed and responsiveness not only in the supply process but also in sales market by reducing delivery lead time resulting in a possibility to shift from forecast-driven to a demand-driven chain. This also provides a possibility to achieve higher flexibility and better quality, with more focus towards product customization.

Product customization is an important factor for success of competitive manufacturing in high cost environment, which demands changes in the processes of manufacturing, distribution and delivery of products. The supply chain and manufacturing strategies needs to be restructured (Hayes and Wheelwright 1984), as mass customization requires a flexible and responsive supply chain, because of the increased product variety. This in turn creates complexity, which needs an agile supply chain. Customers get value as they are able to get customized products, and at the same time, manufacturers are allowed less excess inventory and markdowns.

In a study of manufacturing offshoring and backshoring activities of German manufacturing companies, Kinkel and Maloca (2009) have highlighted the key role of flexibility and quality as decision competitiveness factors for local supply chains to accommodate such complexities. Such flexibility in the manufacturing system can be availed in various ways, e.g. ability to manufacture and deliver in various batch sizes and differing degrees of complexity, the integration of activities and the effective flow of information (Zairi 1993). Literature has highlighted this aspect as responsiveness to succeed in time-based competition in order to make rapid and balanced response to unpredictable changes in the today's turbulent manufacturing environment (Holweg 2005). In this context, role of future manufacturing systems and advanced manufacturing technologies (AMT) have been emphasized by Zairi (1993) to develop competitiveness through flexibility, quick response and innovativeness by utilizing various technological innovations such as CAD/CAM, robotics, advanced information and communication technology (ICT) tools, etc. Competitive manufacturing companies effectively deal with the concurrent evolution of products, processes and production systems through the integrated use of different innovative methodologies and digital tools implementing these methodologies that can interoperate properly and effectively (Tolio et al. 2013).

Yet another factor enabling competitive high cost manufacturing is the focus towards knowledge-base as a strategic resource. Westkämper (2013) has described the need of higher education and skills to facilitate future manufacturing in Europe demanding more specialized know-how of complex and customized products and processes. This creates opportunity to design and optimize a more holistic manufacturing system, including product development and realization, and logistics (Manufuture 2004). From the make/buy perspective, companies without this knowledge base involve in strategic alliances and networks for availing complementary skills for product development, provision of manufacturing and marketing, or technology.

This opens up further possibilities for new servitized business models by moving beyond manufacturing and by offering services and solutions through the products (Vandermerwe and Rada 1988). Open manufacturing is hereby a new concept for the production of customised physical goods, based upon flexible network of small production units aligned to mass customisation and rapid manufacturing for fast and flexible fulfilment of small size orders. The coordination and support with vital services of all these small production units are performed by a manufacturing service provided (MSP) (Open Garments 2009).

METHODOLOGY

The method used in this study is based upon a participatory action research (PAR) based on an EU-funded project called fromRolltoBag. More project details can be retrieved from the project website (http://fromrolltobag.eu/). The project serves as an ideal setting or vehicle for revealing deeper understanding of the assumptions and consequences of our actions (Ayas and Zeniuk 2001), in this study revealing understanding of consumer-driven local production system based on virtual design and digital manufacturing. This started with observing the current problems in delocalized apparel production system based on forecasting, long lead times and low sell-through (Mattila, King, and Ojala 2002) resulting in the ideation for the project. Similar ongoing projects like Reshoring Initiative and Apparel Made for you (AM4U) also resulted in reflecting on the current industrial practices.

In the adopted PAR methodology, cyclical activities involving observation (reviewing current processes), reflection (identifying what needs to be improved), planning (discussing and selecting implementation strategies) and action (reviewing and implementation of interventions) are followed, based upon the iterative action research loop proposed by McNiff and Whitehead (2002). Within the scope of fRTB, data was continuously collected since January 2015. A multi-method process of data collection was used, which emphasized iteration between planning, acting, observing and reflecting. We conducted a state-of-the-art review of literature on technologies and systems available as a part of knowledge search on: (i) 3D product development (avatar, sales configurator, interactive rendering), (ii) mass customization types (made to measure etc.), and (iii) digital production technologies (e.g. digital printing, digital cutting etc.). Further we collected qualitative data through 3 technical meetings among the core partners, a consumer survey, and interviews with two industry experts, 2 focus group discussions (each on "Enabling virtual design & sales" and "Enabling digital manufacturing technology"). In addition, field notes were taken of many informal conversations, observations, e-mail conversations, and minutes of the working group meetings and the advisory meetings of the research group. A proper log of all these data was maintained and shared through cloud. The consumer survey was conducted to gauze consumers' preference towards such digital interact-ability for customization possibilities. The interviews conducted with the industry experts aimed at identifying the current status and drivers and factors for success of such fRTB concepts in the industry. Further the joint technical meetings were conducted with continuous and iterative reflection throughout the action phases (Flick 2009), on data gathered to develop a system outline (based upon exploring the emergent key stages for realizing such fRTB value chains). This consists of seven stages, viz. preparation, 2D pattern-making, marker making, measurement, 3D visualization,

production and PLM-ERP. Further a multi-tiered input-output model was developed based on (i) virtual online design and sales, (ii) local digital manufacturing and delivery, and their interact-ability. A plan was generated to develop and execute pilot fRTB lines for different product types (e.g. men's' shirt, women's' jacket), different print designs, sizes and components. A choice of suitable materials and production line technology (for printing, cutting and assembly) were made. Throughout the project, the data were discussed in the working group and research team until stable themes and plans developed. Presently fRTB is still ongoing and concentrating on realizing these pilot lines.

Together with the working group, the authors have been involved as participants to facilitate change and implement the fRTB concept. We reflected on the findings throughout the action phases, developed subsequent plans for implementation. The researchers' role varied between the stages of the research, being project coordinator, leader and key researchers and accordingly conducted tasks, designed solutions and analysed data. Overall the authors were actively involved in overseeing the project, designing and reviewing several documents and tools produced by the project.

FINDINGS

The findings of the different phases of the PAR show that the key to designing a local fashion apparel value chain lies in tailoring a consumer-driven, digitally-enabled chain.

As a matter of fact, it was revealed that consumers are still reluctant to pay double or thrice just for "made in own country" label unless there is some degree of co-design or customization associated with it. It was highlighted from the perspective of consumers' experience the "feeling of ownership through co-designing" was crucial. fRTB emphasized this by incorporating implementation of an interactive human-like avatar in work package (WP 3) which can interact with consumers, for e.g. to customize fit, have conversation, produce virtual garment try-on etc. This avatar is supported through 3D sales configurator and rendering (in WP 4) which a consumer can alter flexibly (e.g. 3D product image, colour and component customization, background and movement, etc.) on any smart platform to enhance own experience. This customization ensures a made-to-measure (M2M) possibility to make orders on demand subsequently resulting in less/no inventory and forecasting error.

To support such a consumer-driven value chain for customized product, digitalization of all key processes is important to ensure less cost and higher speed. It was highlighted by one of the experts that in order to succeed in a high-cost environment, manufacturing must involve little labour otherwise there is no real cost advantage. Even though digitalization has become common to every supply chain to achieve various operational advantages, new digital processes like digital and 3D printing, digital cutting etc. are essential enablers of such fRTB concepts. Additionally, digitalization at the consumer front has become equally crucial by offering various consumer configurators (e.g. 3D body scan, biometric size measurement, human-like avatar). These have been emphasized in two WPs of fRTB ("3D sales configurator and rendering" and "fRTB digital production technology") through development of "3D modular and interactive product image", "using digital production technologies like printing, cutting, assembly", and "interactive web site and order management".

Furthermore, one of the industry experts emphasized, "B2C digitalization for consumer

configuration and also other forms of digital applications must be integrated." A key to success of such concepts underpinning local chains lie in integrating and connecting all the modules seamlessly, e.g. connection of production technology to virtual sales and design technology. For instance, one of the industry experts highlighted the importance of digitalizing the design to a print file and the pattern to generate digital cut file and seamlessly integrate the two to develop an integrated, flexible and agile value chain. This creates potential to develop such local manufacturing set-ups based upon a cloud service concept availed by branded retailers, in the form of open manufacturing, digital marketing platforms. On another note, the brand manufacturers emphasized that that key to run local value chains is to have in-house process know-how (of pattern-making and printing) as it was put "a flexible system ensures local manufacturing or mix. If you control the supply chain till the cutter you can choose to send the CAD file to a local cutter for quick manufacturing and delivery or make sustainable manufacturing. So knowledge of pattern making, CAD/CAM is very important to ensure such control."

DISCUSSION AND CONCLUSION

Our PAR conducted via fRTB project revealed three major CSFs of a local fashion value chain, viz. we identified through are: (i) advanced digitalization of design and manufacturing operations, (ii) flexible, integrated and agile operations, and (iii) enhanced customer experience with product servitization, thus enabling a consumer-driven, digitalized value chain.

Role of ICT and AMT have been emphasized in extant literature for enabling competitive manufacturing by ensuring flexibility, responsiveness and innovativeness (Tolio et al. 2013, Zairi 1993). In this line, we find evidence of how such local fashion value chains should incorporate technologies like digital and 3D printing, digital cutting, digital order management and sales to seamlessly integrate, be quicker and reduce cost of operating in a high cost environment. However, success of a digitalized fashion supply chain lies in integrating it with a digitalized experience created for the consumers. This front-end digitalization ensures higher degrees of product differentiation through customization and co-design innovation (Kinkel 2014) to match the product-process system of a "one-of-a-kind" product (Hayes and Wheelwright 1984). The fRTB project shows that advanced digital tools offered to consumers, like interactive 2.5D or 3D avatars, easy biometric sizing systems, 3D body scanning, etc. ensures such co-creation experience to the consumers which can lead to "willingness to pay" a higher price for M2M garments. Furthermore, such advanced digital technologies can shorten the time to market, increase efficiency and remove the need for some stages in the supply chain, such as physical product samples, and at the same time enable a more flexible response to customer needs.

It is interesting to note, that the CSFs for driving a local value chain in a retail-dominated industry like fashion-apparel where the branded retailers are predominantly the focal firms, are pivoted to "buying" of competitive manufacturing competences as services. Along similar lines, fRTB explores the possibility of open manufacturing business model in fashion (Open Garments 2009), where small manufacturing SMEs with the process know-how could make products ordered by different brands and deliver to the consumer; the brands would log into MSP's cloud services who organizes such

manufacturing networks, while consumers can co-design and they get delivered. On the other hand, CSFs for the fashion branded manufacturers lies in driving a shift from labour/resource-intensity towards knowledge-intensity based manufacturing and enabled by digitalization. However, such a shift holds success, as revealed in fRTB project, only in case of high-end products (either marked by high degrees of customization or are designer-based), and is in line with the findings of Martínez-Mora and Merino (2014) showing that the feasibility of reshoring only for high range products demanding smaller batch sizes and frequent deliveries. Increased competitiveness in such activities is reinforced through "increased investment in activities that remain internalised within the company" (Martínez-Mora and Merino 2014), as was also highlighted by the experts in fRTB. Such internalization of the knowledge-intensity for competitive manufacturing in consumer-driven local fashion value chains is characterized by gaining customer information and creating unique manufacturing orders from them. As was highlighted through fRTB, the M2M companies possessing the internal know-how of printing and pattern-making along with digital tool to convert the co-created design to a unique manufacturing order can have a control over the entire system with the possibility to optimize costs. Such control renders high degrees of flexibility and responsiveness to local supply chains and decisive competitive advantage (Kinkel and Maloca 2009).

In all, our study reveals that competitive success of local fashion value chains lies in creating focussed differentiation through consumer-drivenness and digitalization. To enable these two aspects, brands need to incorporate consumers in the co-design process. In addition, knowledge-intensity is a key to the competitive manufacturers for integrated control over the core processes; on the other hand, branded retailers can rely on open manufacturing services and concentrate on investments in designing unique consumer experience.

Future research needs to be conducted in order to explore how these CSFs can actually results in creating competitive advantage in such local high cost environments. Within the scope of fRTB, we intend to extend our work in inspecting how such value chains actually impact the key performance measures of firms. Further, as was highlighted earlier such fRTB concepts are not going to replace but complement mass production supply chains, hence it becomes interesting to investigate what product categories are best candidates for success in such environment. Still a lot of processes in apparel production, e.g. sewing are manually conducted; in this line investigating new garment design and pattern construction and assembly technologies to minimize the total labour content of the processes needs to be accomplished to open ways for radical innovation.

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