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Exploring current enablers and barriers for sustainable proximity manufacturing

Sustainable
proximity
manufacturing

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Abstract

Purpose – Amidst offshoring and reshoring trends, the purpose of this paper is to explore why business practitioners, especially from the labour-intensive clothing industry, choose to manufacture some products in proximity to the high-cost European market. Moreover, the rise of sustainability concerns led us to further explore whether these reasons relate to triple bottom line (TBL): business, environment and society.

Design/methodology/approach – The content analysis was adopted for within-case and cross-case analysis of data from semi-structured interviews of managers from 12 clothing companies.

Findings – Within-case analysis showed enablers and barriers (factors) of proximity manufacturing within each company's characteristics under TBL. Cross-case analysis showed the most-mentioned enablers (high-quality suppliers, short lead-time and fast replenishment) and barriers (expensive production cost and lack of industrial set-up and seamstresses). The findings revealed both common and different factors from existing studies.

Research limitations/implications – Besides being motives for companies to bring manufacturing back to Europe, the results can be used by researchers and companies to develop criteria and performance measures of manufacturing locations for enhancing the TBL sustainability. Future research may explore different locations and industries for possibilities of proximity-manufacturing generalisation.

Social implications – Findings show that governments could focus on eliminating barriers of proximity manufacturing and creating favourable institutional infrastructure for the European clothing industry and sustainability.

Originality/value – This paper highlights updated proximity-manufacturing factors from practices in relation to TBL sustainability, including support for proximity manufacturing as a practice for TBL enhancement.

Keywords Sustainability, Reshoring, Supplier selection, Sustainable supply chain, Local sourcing, Manufacturing location decision

Paper type Research paper

1. Introduction

Over the past few decades, companies have moved manufacturing from local high-cost countries to foreign low-cost countries, giving rise to the offshoring phenomenon. However, there seems to be a trend of bringing foreign manufacturing back home, known as back-shoring, or reshoring (Fratocchi *et al.*, 2016), due to operations and control problems at foreign locations (Kinkel and Maloca, 2009; Gray *et al.*, 2017). Reshoring is particularly common in the USA and Europe (Fratocchi *et al.*, 2016). Companies reshoring manufacturing mainly have characteristics suitable for manufacturing in high-cost countries, e.g. with high technology intensity and automation (Arlbjørn and Mikkelsen, 2014). Nevertheless, some companies manufacture their labour-intensive products, such as



garments, at their home high-cost countries in the USA and Europe in order to gain benefits from proximity to their customers and headquarters (Forney *et al.*, 1990; Bolisani and Scarso, 1996; Macchion *et al.*, 2015). Labour-intensive products are sometimes manufactured in neighbouring lower-cost countries in a practice known as nearshoring in order to gain both lower labour costs and proximity to their customers and headquarters. (Tate *et al.*, 2014; Sirilertsuwan *et al.*, 2018). In this paper, proximity manufacturing includes domestic or local manufacturing, nearshoring and reshoring because they provide companies benefits of proximity to their customers and headquarters. Moreover, proximity manufacturing includes both a company's own manufacturing and outsourcing manufacturing provided by suppliers.

Due to trends towards sustainability, companies are now exploring ways to make their production and supply chain more sustainable by focusing on the triple bottom line (TBL), which consists of economic, environmental and social dimensions of sustainability. The textile and clothing industry, a labour-intensive industry, contains many firms who actively implement various practices concerning sustainability. However, the industry still lacks sustainable practices relating to manufacturing locally in proximity to home and local markets (Turker and Altuntas, 2014). The majority of existing academic studies on proximity manufacturing, especially regarding the clothing industry, have still been focussed on the economic dimension, ignoring the environmental and social dimensions (Sirilertsuwan *et al.*, 2018). Therefore, it is worthwhile to investigate factors of proximity manufacturing from the managers' experiences and views in order to point out which positive factors (enablers) make some companies pursue proximity manufacturing; whether there are other negative factors (barriers) besides labour costs hindering proximity manufacturing; and whether reasons for proximity manufacturing are solely based on the economic dimension, or whether they also include environmental and social dimensions of sustainability. This paper also aims to explore whether reasons revealed in prior studies are current reasons for proximity manufacturing, and whether there are other unrevealed reasons. Therefore, the research questions (RQs) are as follows:

- RQ1.* Why do clothing companies in high-cost countries choose proximity manufacturing over distant manufacturing and are these reasons based on TBL? This question explores positive factors that managers perceive as enablers of proximity manufacturing under TBL.
- RQ2.* Why do clothing companies in high-cost countries not choose proximity manufacturing and are these reasons based on TBL? This question explores negative factors that managers perceive as barriers to proximity manufacturing under TBL.

This paper is structured as follows. First, the literature review gives background on the TBL concept, as well as enablers and barriers of proximity manufacturing from existing studies. Second, the methodology section describes research design, including sampled company information. Finally, enablers and barriers extracted from each interview are presented and compared with existing studies in order to show common and unrevealed reasons of proximity manufacturing.

2. Literature review

2.1 Background on the TBL concept

The TBL concept by Elkington (1998) was initially used in company reports in order to measure corporate performance in not only economic but also environmental and social terms, and is now widely used in sustainable supply chain management research (Pagell and Wu, 2009; Li *et al.*, 2014; Turker and Altuntas, 2014; Khurana and Ricchetti, 2016).

This is because TBL concept deals with sustainability in all economic, environmental and social dimensions. This paper adopts the TBL concept as a tool for presenting whether current managerial manufacturing decisions regarding proximity manufacturing involve not just the economic dimension but also the environmental and social dimensions. Moreover, as this paper focuses on private companies, the economic dimension includes only economic performance of firms but not of nations, including concepts such as economic growth. Therefore, the term “business dimension” is used instead of “economic dimension”. The economic performance of nations is instead included in the social dimension, which relates to the well-being and wealth of people, including such concepts as local cultures and skills, local businesses, employment, economic growth, health of workers and consumers and social benefits and compliance (Khurana and Ricchetti, 2016). For the environmental dimension, this paper refers to natural resource consumption and waste emission. The examples of measured environmental impacts from manufacturing are GHG and toxic emissions, hazardous waste generation, and energy and water consumption (Egilmez *et al.*, 2013).

The TBL concept shifts the company focus from measuring the business performance and success through traditional measures such as costs, profits, time, flexibility and quality to through value-adding and benefits to other stakeholders (Golini *et al.*, 2014; Padin *et al.*, 2016). Companies have started to initiate corporate social responsibility (CSR) programs for supporting environmental and social sustainability (Padin *et al.*, 2016), which can be sources of business competitive advantage (Golini *et al.*, 2014). However, their focus and interpretation on TBL concept are usually different from each other's and depend on their business strategies, resources and capabilities, resulting in different sustainable practices (Colbert and Kurucz, 2007; Glavas and Mish, 2015). Some CSR initiatives fail because companies ignore the opportunities of CSR initiatives to create both social and business benefits simultaneously (Porter and Kramer, 2006).

Environmental and social sustainability are involved in many stages of business operations, including product or process design and development, procurement or purchasing, production operations or outsourcing and logistics and distribution (Golini *et al.*, 2014). Specifically, for choosing manufacturing locations, the sustainable factors under the environmental dimension relate to ecosystem vitality, environmental health and environmental factors within production. The sustainable factors under the social dimension relate to governance, education, individual (liberties and rights) and community. The sustainable factors under the business dimension relate to cost, market, economic stability, suppliers and growth (Chen *et al.*, 2014, p. 159).

2.2 TBL factors of proximity manufacturing from existing studies

Existing studies in different locations show similar reasons for proximity manufacturing. Forney *et al.* (1990) presented short lead-time, competitive costs and quality control as US domestic manufacturing reasons, while two European studies (Bolisani and Scarso, 1996; Macchion *et al.*, 2015) presented superior product quality, product innovation and craftsmanship as enablers of domestic and nearshoring manufacturing. However, these studies have focussed on only the business dimension of TBL. Only recently have a few researchers started to pay attention to proximity manufacturing of the clothing industry together with all three dimensions of TBL sustainability (Desai *et al.*, 2012; Ashby, 2016; Sirilertsuwan *et al.*, 2018). Desai *et al.* (2012) showed an interesting view about the ability of proximity manufacturing to match supply and demand, resulting in decreasing product leftovers, which yields environmental benefits because of lowered resource consumption and waste emissions from production. Ashby (2016) showed the insightful benefits of reshoring in all TBL dimensions such as better communication and trust with suppliers, greater supply chain visibility and better response to sustainability issues and local economy contribution. Sirilertsuwan *et al.* (2018) pointed out benefits of proximity

manufacturing in each dimension of TBL for the clothing industry from their reviewed paper concerning proximity manufacturing enhancing at least one of TBL dimensions.

More reasons and benefits conducted by previous studies on proximity manufacturing focusing on clothing industry and/or European context are shown in Table I. Enablers in Table I were classified under each TBL dimension and four business aspects, adopted from Sirilertsuwan *et al.*'s (2018) findings based on 45 relevant studies specific to the clothing industry but not limited to only one clothing category. Existing studies in Table I show that environmental and social dimensions still receive less attention than does the business dimension, which is also the main factor driving proximity manufacturing.

TBL dimensions	Enablers (the number of European market studies/ all-market studies by Sirilertsuwan <i>et al.</i> , 2018)	Existing studies ^a	
Business: profits (cost-price-sales)	Trade policies (5/13)	1, 8, 10	
	Lower logistics costs (3/7)	1, 3, 8	
	High-value products (3/6)	1	
	Lower labour costs (4/11)	1	
	Knowing local taste (1/9)	1, 7	
	Financial governmental support (1/9)	1	
	Emerging markets (2/8)	1	
	Reduced inventory costs	1, 8	
	Avoid risks	1, 5, 8, 10	
	Garment types (high-quality, fashion, complex, make-to-order)	2, 5	
	Made in country label	9	
	Fewer unsold or discount products	10	
	Business: service and delivery	Short lead-time (8/22)	1, 3, 5, 6, 7, 8, 9, 10
		Quick response (6/13)	1, 4, 8, 9, 10
Capacity flexibility (5/11)		1, 4, 9, 10	
Logistical infrastructure (3/10)		1, 8	
Fast replenishment (4/9)		1, 6, 7, 8	
Production control		1, 3, 5, 7, 9	
High services		2, 8	
Smooth operations (culture)		1, 3, 7, 8	
Business: product/process development	Governmental support (1/7)	1	
	Product design (1/8)	1, 2, 3	
	Quick product development	8	
	Knowledge sharing	9	
Business: product quality	Meeting product specification (6/13)	1, 2, 3, 4, 5, 7, 8	
	Inspection	1, 4, 9	
	Specialized suppliers	1, 2, 3, 7, 8, 9	
Environmental	Lower carbon emissions: transportation (4/6), filtration/energy source (5/6)	1, 8, 9, 10	
	Environmental governmental support (3/6)	1, 9, 10	
	Environmental-friendly materials	1	
	Avoid misconduct environmental practices	9, 10	
	Less waste and material usage from reduced unsold products	10	
Social	Job creation (4/15)	1, 10	
	Economic growth (1/11)	1, 9	
	State support (4/9)	1, 10	
	Better traceability and supply chain visibility	8, 9	
	Economic and social upgrading (local businesses and workers)	9	

Table I. Enablers of proximity manufacturing from existing studies under TBL

Notes: ^aAuthors with studied industries and locations are 1. Sirilertsuwan *et al.* (2018): clothing, Europe and others; 2. Bolisani and Scarso (1996): clothing, Italy; 3. Macchion *et al.* (2015): clothing, Italy; 4. Forney *et al.* (1990): clothing, USA; 5. Gray *et al.* (2017): clothing and others, USA; 6. Cammett (2006): clothing, global; 7. Kinkel and Maloca (2009): unspecified, Germany; 8. Srail and Ané (2016): unspecified, France and UK; 9. Ashby (2016): clothing, UK; 10. Desai *et al.* (2012): clothing, USA

In contrast, barriers of proximity manufacturing, mainly derived from offshoring reasons from existing studies, are gathered in Table II. It shows in which situations distant manufacturing is more competitive than proximity manufacturing. Costs are common main barriers relating to business dimension, and environmental and social dimensions are still ignored. Even after the 2013 collapse of Rana plaza in Bangladesh, which caused thousands of deaths and injuries, clothing companies still did not relocate or reshore garment manufacturing closer to their home countries for better governance in order to avoid reputational risks. Instead, companies developed two agreements to ensure worker safety in factories (Jacobs and Singhal, 2017). Therefore, it is time to find out whether environmental and social reasons play greater roles in current manufacturing decisions than do business reasons among the rise of sustainability trend and risks at manufacturing locations, and if so, what those reasons are.

3. Methodology

The paper is exploratory in nature and primarily based on interviews with key managers from 12 different clothing companies. Interviewing key managers gains insight into companies' own experience and reasoning regarding the positive and negative factors that are enablers and barriers of proximity manufacturing under TBL, thus, revealing the reasons they choose proximity manufacturing. This paper adopts a qualitative approach based on interviews (Miles and Huberman, 1994; Yin, 2003) and uses RQs, the TBL concept and existing literature of proximity manufacturing towards TBL sustainability as guidelines for collecting data, creating an initial coding scheme, coding data and analysing data. TBL dimensions and four business aspects proposed by Sirilertsuwan *et al.* (2018) were used as the predetermined categories in the initial coding scheme. The four business aspects are profits (cost-price-sales), service and delivery, product or process innovation and development and product quality.

3.1 Company selection

All companies were chosen based on their potential to fill the predetermined coding categories from existing studies and to provide differing views. Therefore, clothing

TBL dimensions	Barriers	Existing studies ^a
Business: profits (cost-price-sales)	Trade policies	2
	Distant favourable costs	1, 2, 4
	New foreign markets	4
	Following investors	4
Business: service and delivery	Risk of lacking local-management and labour	5
	Industrial structure unavailability	3
	More availability of special distant materials and products	2, 4
	Lacking production capacity and technology	2, 3
	Lead time	2
Business: product/process development	Production inflexibility especially textiles	2
	Favourable distant production capabilities and design	2
	Technology innovation	1
	Securing knowledge	4
Business: product quality	Product quality and sophisticated printing in offshoring sites	1, 2
Environmental	US pollution standards	2
Social	US labour unions	2

Notes: ^aAuthors with studied industries and locations are 1. Macchion *et al.* (2015): clothing, Italy; 2. Forney *et al.* (1990): clothing, USA; 3. Gray *et al.* (2017): clothing and others, USA; 4. Kinkel and Maloca (2009): unspecified, Germany; 5. Ellram *et al.* (2013): unspecified, Europe and others

Table II.
Barriers to proximity
manufacturing from
existing studies
under TBL

companies selling fast fashion items were first approached because they seem to require proximity-to-market in order to achieve short lead time. After that, other types of clothing companies were added until obtaining common enablers and barriers mentioned by almost every manager, but few new common enablers and barriers. Ultimately, 12 Swedish clothing companies representing companies operating in high-cost environments were sampled. These companies comprise different categories: four in fashion, with a main focus on womenswear; one in jeans; two in menswear; three in functional outer-wear and sportswear; and two in workwear categories. All companies have headquarters and main markets in Europe. Company information was gathered in Table III, with pseudonyms referring to dominant products sold by each company.

Sampled companies	Year of founding	Number of employees	Turnover in 2016 (€million)	Product type (dominant product)	Average retail price	Distribution channel
FAS1 (internal brands)	1950s	4,000+	374	Fashionwear (trousers and jersey) for women ^a , men, kids	< €50	B2C: stores ^a , online
FAS2 (internal and external brands)	1950s	4,000+	353	Womenswear ^a (lingerie), and kids-wear (jersey)	< €50	B2B, B2C: stores ^a , online
FAS3 (internal and external brands)	1940s	580 in headquarter	200 (140 for the internal brand)	Womenswear ^a , kids-wear, home interior	< €50	B2C: online (only home interior concept store)
FAS4 (internal and external brands)	2000s	300	124 (50 for internal brand)	Fashionwear for women (eveningwear, party-wear)	< €50	B2C: online
DNIM (internal brand)	2000s	80	49	Denims ^a (jeans) and tops	> €150	B2B, B2C (own stores 50%)
MEN1 (internal brand)	1920s	240	79	Menswear (premium shirts)	> €150	B2B ^a , B2C: stores, online
MEN2 (external brands as a marketer)	2010s	47	14	menswear (60% for cloth/outer-wear, 10% shoes)	> €150	B2C: online
FXN1 (internal brand)	1990s	23	13	Functional fashion outdoor sportswear (jackets), adults ^a , kids	€51-€150 > €150	B2B ^a , B2C (online)
FXN2 (internal brand)	1970s	72 in headquarter	50 (100 for brand)	Functional Sportswear (inner base layer ^a)	€51-€150	B2B
FXN3 (internal brand)	1910s	58 in headquarter	47 (60 for brand)	functional wear (jackets ^a) 60% for female, outdoor	€51-€150 > €150	B2B, B2C: online, own 1 store
WRK1 (internal brand)	1920s	2,000+	398	Functional workwear (construction trousers)	€51-€150	B2B
WRK2 (internal brand)	1950s	250 (3,200 stores and production in the group)	96	functional workwear (craftsmen trousers with details)	€51-€150	B2B: subsidiaries, dealers, large companies; B2C: stores

Table III.
Company characteristics

Note: ^aIndicates dominant level

3.2 Interview protocol and data collection

Only knowledgeable informants, i.e. managers being responsible for assigning where to manufacture which products, were contacted and sent the interview question guidelines. Some managers referred us to others better suited to answering the questions, or invited others to join the interview. Manager titles included purchasing development manager, supply chain director and manager, managing director, supply chain and sustainability controller, purchase/production manager, and product buyer and developer.

A semi-structured interview protocol was employed because of the flexibility to ask follow-up questions to further investigate interesting aspects raised by managers and to ensure correct understanding. To increase chances to obtain new factors, interview questions were structured to be open, not mentioning enablers and barriers from existing literature. Moreover, in the last session of each interview, if managers mentioned factors not related to any TBL dimension or business aspect, the interviewer would ask guided questions towards the unfulfilled dimension/aspect to confirm that managers did not forget to mention any factors. Besides interviewing managers at each company headquarter during April–November 2017, secondary data from company websites were used before and after interviews to obtain information on company background, products, markets, manufacturing locations, sustainability and social projects and annual and sustainability reports. Additionally, the interviewer visited a small in-house manufacturing unit of MEN1 and product showrooms of FXN1 and FXN2 at respective company headquarters as well as a shop each for FAS1 and FAS2.

Interviews were with one interviewee and lasted 60–120 min, except for DNIM, which had two interviewees responsible for different product manufacturing decisions. Creating and sending question guidelines to managers, as well as collecting secondary data in advance, helped shorten interview time while still gaining qualified data to answer our research questions and reveal findings different from prior research. Interviews were recorded and transcribed, totalling 12 transcripts for 12 companies with 13 interviewees. Sampling different types of clothing companies as different data sources with select knowledgeable informants helps answer why companies in the labour-intensive industry choose to manufacture products in high-cost environments, and whether reasons relate to TBL and are different from existing studies.

3.3 Coding and analysis

Data analysis had two stages: within and cross-case analysis. Within-case analysis was carried out in order to reduce data (Miles and Huberman, 1994) and reveal enablers and barriers of proximity manufacturing within the characteristics of each company. Cross-case analysis was then made in order to identify common or different factors among different company contexts. Each company transcript was read, analysed, and coded using the direct content analysis technique (Hsieh and Shannon, 2005) into tables of the coding schemes for enablers and barriers.

The within-case analysis focussed on three main components. First, enablers were identified in order to understand why the managers chose proximity manufacturing over distant manufacturing. Second, barriers through their experiences from locating manufacturing in different countries were identified. Third, company characteristics and strategies being relevant to the factors that the managers perceived were indicated. All three components were gathered and later summarised in tables of enablers, barriers and company characteristics for cross-case analysis. Besides Table III, Tables IV–V also show additional company information regarding manufacturing, replenishment and sourcing strategies.

4. Results from within and cross-case analysis

4.1 Enablers

Besides showing enablers of proximity manufacturing, the findings in Table VI demonstrate the importance of proximity between material and garment suppliers, which

Table IV.
Manufacturing
locations and
company
representatives to deal
with manufacturers

Sampled companies	Manufacturing locations	Representatives (not from headquarters)
FAS1	Outsourcing: China ^a , Bangladesh ^a , India ^a , Turkey (Ukraine, Romania), South Korea, Italy, Portugal, Sweden	Six production offices (Turkey and Asia)
FAS2	Outsourcing: Hong Kong ^a , China ^a , Bangladesh ^a , Pakistan, India, Cambodia, Vietnam, Turkey, Italy	Six production offices (Turkey and Asia)
FAS3	Outsourcing: China 55%, India 19%, and Bangladesh 8%, the rest: Belgium 1%, Pakistan 1%, Sweden 1%, Turkey, Portugal	Agents from the corporate group
FAS4	Outsourcing: China ^a , UK ^a , India, Turkey, Bangladesh, Pakistan 1%	Buyers in London and Hong Kong; agents in Bangladesh and Pakistan
DNIM	Outsourcing: Italy ^a , Tunisia ^a , India, Portugal, Turkey, Sweden, Lithuania	An Italian office; an agent in Portugal and India
MEN1	Outsourcing with own production system at manufacturers' sites: Romania ^a , Lithuania, Estonia, Macedonia	No, only one employee in Estonia and Romania
MEN2	Not dealing with garment manufacturers	—
FXN1	Outsourcing: Asia 90% (China ^a , Vietnam ^a , India), Italy, Baltics, Sweden	No
FXN2	Outsourcing: Asia 80% (China ^a , Vietnam, Bangladesh), Lithuania ^a , Romania, Portugal, Turkey, Sweden, Slovenia	Buying offices in China, Vietnam and Bangladesh
FXN3	Outsourcing: Asia 100% (China ^a , Bangladesh ^a , Vietnam)	A representative office in China
WRK1	Outsourcing: Asia ^a , Madagascar ^a , Portugal, Turkey, Ukraine, Lithuania, Sweden; In-housing ^a : Latvia, Ukraine, Russia	A purchasing office in Hong Kong
WRK2	Outsourcing (20%): Bangladesh (vertical) and few in Baltics (not workwear); In-housing (80%) Vietnam and Sri Lanka ^a	Own factories

Note: ^aDominant locations

contributed towards eight enablers, denoted by X^a and X^b. This, in turn, led manufacturing by five companies (DNIM, MEN1, FXN1, WRK1, WRK2) to be in proximity to the European consumer market.

Proximity between fabric and garment suppliers seems related to level of fabric control and retail prices. The aforementioned five companies have high level of fabric control by having either nominated component specifications and suppliers or in-house manufacturing, whereas the other companies have low-to-medium level of fabric control and rely on either garment suppliers to source nominated fabrics from any suppliers (FAS1, FAS3, FAS4), or vertical suppliers to produce both fabrics and garments (FAS2, FXN2). Furthermore, the companies with low-to-medium level of fabric control have low retail price in their sectors (fashionwear and functional wear). Therefore, having garment manufacturing in Europe in proximity to fabric suppliers seems to help companies achieve high levels of fabric control, leading to high quality and high retail price.

The most-mentioned enabler for all companies (except FXN3, who has 100 per cent Asian manufacturing) is specialisation of European materials and garments suppliers. Despite different company characteristics and strategies (see Tables III–V), most managers stated that European suppliers are the best of for certain products; for example, denier tights and bike-wear from Italy, suits and jackets from Portugal, outerwear from the Baltics and vegetable-tanned belts from Sweden. In addition, an interesting product quality enabler is locating in-house manufacturing in Eastern Europe, which helps WRK1 maintain in-house competency in design and production as well as increase product development skills through directly experiencing what kinds of designs can feasibly be produced to yield high-quality products.

Short lead time is the second most-mentioned enabler, cited by eight companies. The other four companies are MEN2, who sells only external brands; FXN3, who has only

Sampled companies	Replenishment and stock policy	Component sourcing and control
FAS1	Replenishment with advanced preparation in Turkey	Mostly nominate specifications
FAS2	Refill stock by Turkish suppliers	Not nominate but most volume from vertical suppliers
FAS3	Replenishment: never-out-of-stock (NOS) products 30-40% of assortment; no seasonal-product replenishment	Suppliers' responsibility
FAS4	Replenishment according to sales. No NOS items	Mainly suppliers' responsibility
DNIM	Repeat orders especially for carry-over-style products (in-stock fabrics); low stock	Own fabric development; nominate specifications and suppliers
MEN1	Replenishment: advanced fabric preparation using forecast-planning; NOS 50% of assortment	Own fabric development; provide components to manufacturers
MEN2	Replenishment: NOS 20% of assortment from its supplier (clothing brands)	–
FXN1	No replenishment due to lots of components and long fabric-production lead-time	Nominate specifications and suppliers
FXN2	50% of turnover from re-ordering	Nominate specifications; European vertical suppliers
FXN3	NOS 30–35% of assortment	Nominate specifications and suppliers
WRK1	Replenishment: fabric preparation using forecast-planning; high stock	Nominate specifications and suppliers
WRK2	Continuously replenishment for good-sales products and carry-over-style; high stock	Nominate specifications

Table V.
Company
replenishment and
sourcing strategies

distant manufacturing; WRK2, who manufactures garments in the Baltics due to proximity to its specialized fabric supplier; and FAS2, whose Turkish suppliers have a long lead time (ten weeks) to develop a sample. For FAS2, the total lead times from sample development, production and transportation between Turkish suppliers for proximity manufacturing and Bangladeshi vertical suppliers are approximately equal because Bangladeshi suppliers take only two weeks for sample development and garment production due to familiarity with ordered styles and in-stock fabric from their in-house fabric production.

As main markets, warehouses, company headquarters and manufacturers are in Europe or in proximity to Europe, total lead time can be shortened by not only short delivery time of final products to warehouses and markets, but also of samples from suppliers or production offices to headquarters. Total lead time is further shortened by short travelling time for managers to visit manufactures; the ease of visiting proximity manufacturers allows managers to have face-to-face price and style discussion and to hand in new style development to suppliers, leading to quick sample development and production start. Managers can also easily visit manufacturing sites for problem solving and process control, as well as for inspection, resulting in delivery-time and product quality assurance. Moreover, delivery-time assurance can also come from choosing the correct supplier size, which gives them production priority (DNIM) and the ability to produce a small volume of garments but still have full product assortments (WRK1).

Among the five companies whose managers perceived the ease of visiting proximity suppliers as an enabler, four of them (FAS4, DNIM, MEN1, WRK1) have a high percentage of proximity manufacturing in Europe and all do not have formal established units in distant locations. Therefore, these five managers have experienced the difference in travelling to different locations for controlling operations, product quality and supply chain. On the other hand, managers from the other six companies with high percentage of distant manufacturing did not perceive this as an enabler because they have formal established units (offices, agents, factories) in distant locations for control.

Table VI.
Cross-case analysis of
enablers under TBL

TBL	Proximity-manufacturing enablers	FAS1	FAS2	FAS3	FAS4	DNIM	MEN1	MEN2	FXN1	FXN2	FXN3	WRK1	WRK2	
Business: profits	Lower duties (xx: to US market)					X ^a	XX	X	X	XX	X ^a	X ^b		
	Lower logistics costs						X ^b							
	Licensed products		X						X	X				
	Postpone production (B2B sales period)			X									X	
	Lower total costs								X ^a					
	Avoid risks		X					X	XX					
	Know local taste (xx: from merchandisers/designers)		XX											
	Garment-cost structure: few operations minutes and costly fabrics													X ^b
	Short lead-time		X		X				X	X	X	X ^a	X ^b	
	Short product-delivery time (xx includes sample delivery)		X		X				X	XX				
Business: service and delivery	Fast replenishment		X		X					X			X	
	Short travelling: price and style discussion				X				X ^b					
	Short travelling: smooth operations				X				X			X		
	High service level				X				X			X		
	Similar culture: smooth operations (xx includes quick sample development)				X					XX				
	Suppliers' size								X ^b					
	Vertical suppliers							X				X		
	Long-term supplier collaboration				X					X	X	X		
	Similar culture: understanding companies' value								X					
	Fast prototype development							X					X	
Business: product quality	Chemical laws								X				X	
	Short travelling: inspection						X		X			X		
	Specialized suppliers		X		X		X		X	X		X	X	
	Quality consistency								X					
	Maintaining competence												X	

(continued)

TBL	Proximity-manufacturing enablers	FAS1	FAS2	FAS3	FAS4	DNIM	MEN1	MEN2	FXN1	FXN2	FXN3	WRK1	WRK2
Environment	Lower gas emissions			X ^a		X	X ^b		X ^b		X ^a		X ^b
	Governmental supports					X							
	Sustainable materials					X							
Society	Working opportunities		X										
	Economic growth												
	Short travelling: chemicals control (xx includes social compliance)					X		XX					
	Laws: non-contaminated products												
	Trust suppliers for compliances												X

Notes: Bolded enablers are not mentioned by existing studies (Table I). ^aFrom proximity between fabric and garment suppliers; ^bfrom both proximity-to-market manufacturing and proximity between fabric and garment suppliers

Table VI.

The ability to shorten the total lead time from proximity manufacturing benefits profits by lowering costs and increasing sales. Besides lowering logistics costs by avoiding air transportation for urgent orders, quick time-to-market lowers total costs through low safety-stock requirements, decreasing warehouse costs and capital tie-up. Moreover, the ability to postpone production decreases risk from speculation (FXN2) and lengthens B2B sales periods (FXN1). Additionally, there seems to be a relationship between turnover and regard for duty costs: the higher a company's turnover is, the lower its concern for duty costs.

The third most mentioned enabler is fast and in-season replenishment. Six managers use proximity manufacturing for in-season replenishment when stock level is not enough to fulfil increasing demand, especially according to climate change. As a result, they can increase sales from capturing in-season demand.

Replenishment policies vary by garment type and company strategy. All four fashion companies use proximity manufacturing for replenishment for agility and quick response, which are crucial in their businesses (Barnes and Lea-Greenwood, 2006). In contrast, FXN2, who does not focus on trendy products and for whom 50 per cent of turnover comes from re-ordering (more carry-over styles from seasons to seasons), also gains replenishment benefits from proximity manufacturing because FXN2 uses vertical European suppliers who help FXN2 save 70 days of total lead time over distant manufacturing due to quicker production and transportation lead times.

Both DNIM and FXN1 do not have replenishment policies and only produce according to sales orders. FXN1 has no replenishment because FXN1's products contain too many components and long fabric-production lead-time. However, WRK1, whose products are as complicated as FXN1's, can achieve replenishment by using its planning tool with sales forecasting to make decisions regarding where and when to prepare fabric in advance and place replenishment. Moreover, FXN1's in-house manufacturing in Eastern Europe is used for the replenished orders due to flexible and responsive production in maintaining high service level of stock for clients. MEN1 and WRK2 also focus on maintaining high service level of stock and using forecast-planning tools for replenishment but their managers choose to replenish their stock periodically rather than in-season. Therefore, fast and in-season replenishment is not an enabler for them.

High service levels also include after-sales and value-added services, leading MEN1 and WRK1 to have small production units in Sweden where both headquarters and main markets are located. The Swedish production units allow companies to fix problems from defective orders and to meet special customer requests, such as add-on prints and embroideries and size adjustment. Moreover, by achieving their strategies of providing high service levels and fast after-sales services, both companies are able to charge premium prices. Additionally, MEN1's design team is able to make a new product prototypes quickly because designers can talk to seamstresses directly and do not need to send the prototype back and forth for correction.

Three managers experience better collaboration with proximity manufacturers than with distant manufacturers in terms of culture and business practices, ensuring smooth operation, shared values, improved communication and faster sample development processes and new product development. This is possibly from propinquity of spatial proximity enhancing interaction (Burmeister and Colletis-Wahl, 1997).

Regarding the environmental dimension, six managers mentioned lower carbon emissions, with four specifically mentioning having manufacturing in proximity to Europe, and five emphasising sourcing fabric in proximity with garment manufacturing, to reduce gas emissions. The latter also reduces transportation lead time and costs by avoiding shipping fabrics and garments forth and back.

FAS2's manager implied sustainable materials as an enabler of proximity manufacturing by moving sock manufacturing from Korea to Turkey due to conventional cotton used by

Korean manufacturers. In addition, DNIM's manager mentioned a Turkish law allowing second-hand garments to enter Turkey for recycling, demonstrating the benefit from local laws in supporting circular economies.

DNIM's and FXN1's managers focussed on ensuring non-harmful chemicals in their products. Proximity manufacturing helps them visit suppliers, allowing them to ensure product safety by controlling the whole supply chain, benefiting not only the social dimension for consumers' health, but also the business dimension for reputational risk avoidance. Furthermore, proximity manufacturing can even be used in combination with distant manufacturing to diversify risk from delivery delays (FAS1) and currency exchange rate fluctuations (DNIM). FXN1 has relatively fewer employees and thus chooses to rely on specialist Swedish material suppliers, who are able to avoid harmful substances in production, in accordance with the EU law REACH.

Regarding the social dimension, FXN1's manager mentioned creating employment opportunities and supporting local components suppliers. Moreover, the manager trusted European companies to comply with European laws.

4.2 Barriers

The most-mentioned barrier in Table VII, by ten company managers, is high production costs in terms of labour, machinery investment and fabric costs. MEN1's manager mentioned increased production costs after Baltic and Eastern European countries joined the European Union. Furthermore, complex garments requiring high production minutes are too expensive to be produced in Europe, where salaries are higher (FXN1, WRK2).

Expensive production costs also lead to higher consumer prices, but customers were either not willing to pay higher prices, or did not feel the companies added sufficient value over distant-produced garments to be worth higher prices (FAS3, MEN1). Having a broad product assortment is another barrier in the product or process development aspect. MEN1's strategy is to have large product variety, leading to small-volume production and the inability to separate production to be close to both main markets, Europe and the USA.

The second most-mentioned barrier is that the textile and clothing industry is not set up close to company headquarters; this was mentioned by six managers, five of them specifically lamenting the current Swedish clothing industry compared to its glorious past. The other managers, whose company (FXN3) has only distant manufacturing, said that there were no facilities and materials suppliers in Europe matching their business requirements (functional garments, big order quantities and low-price strategy). The third most mentioned barrier is a tie between the lack of production capacity and seamstress availability in Europe for big commercial orders, and long-term collaboration with distant suppliers.

Regarding the quality aspect, four managers chose distant manufacturing because of the specialisation of distant manufacturers to provide high level of finished products, which is the fifth most-mentioned barrier. Moreover, product quality can also lead managers to choose distant manufacturing: FAS4 cited a lack of machinery and technical knowledge in Sweden; MEN1 mentioned that suppliers possessed outdated machinery; and MEN2 stated that factories in Italy tended to be slow or old.

A surprising barrier is that interviewed companies were either unable to develop or overlooked developing relationships with European suppliers. Therefore, managers found it easier to send product specifications to production/buying offices or agents in distant locations for sourcing manufacturers. Additionally, company history and strategy also play important roles in hindering proximity manufacturing. For example, FXN3's manager said, "[Our location decision was] a historical issue, actually. Because we started the brand, in order to get into the market, we need to have price-driven; and the only option it was at that time, at the end of 90s, was via, through China and Far East especially".

Table VII.
Cross-case analysis of
barriers under TBL

TBL dimensions	Proximity manufacturing barriers	FAS1	FAS2	FAS3	FAS4	DNIM	MEN1	MEN2	FXN1	FXN2	FXN3	WRK1	WRK2
Business: profits	Trade policies	X	X	X ^a	X ^a	X ^a	X ^b	X	X	X	X	X	X
	Relative high costs in Europe (especially Sweden ^a and countries after joining European Union ^b) to distant locations	X	X	X ^a	X ^a	X ^a	X ^b	X	X	X	X	X	X
	Sourcing Asian components						X	X					X
	High selling price						X	X					
	Risk: political situation						X	X					
	Cost structure of garments: high operations minutes						X	X					X
Business: service and delivery	Price or cost driven strategy										X		X
	Long sample development lead time	X	X	X	X	X							
	Lack of industry set-up in Sweden and Europe ^a	X	X	X	X	X					X ^a	X	X
	Lack of seamstresses and production capacity in Sweden and Europe ^a	X	X	X	X	X					X ^a	X	X
	Inability/Oversight in developing European suppliers	X	X	X	X	X							
	Distant vertical suppliers	X	X	X	X	X							
	Good/Long-term collaboration with distant offices or suppliers	X	X	X	X	X							
	Having production office in Far East with local employees	X	X	X	X	X							
Business: product/process development	Technology and technique for communications	X	X	X	X	X							
	Company's incapability in differentiating products						X	X					
	Too product variety to separate production close to main markets						X	X					
Business: product quality	Specialized and high-quality suppliers						X	X					X
Environment	Machinery and knowledge problems in Europe						X	X					X
	Environmental-friendly transportation mode: by boat						X	X					X

(continued)

TBL dimensions	Proximity manufacturing barriers	FAS1	FAS2	FAS3	FAS4	DNIM	MEN1	MEN2	FXN1	FXN2	FXN3	WRK1	WRK2
	No certified fair-trade cotton suppliers					X							
	Conflicting legal framework for recycling			X									
	No set-up to collect from store to bring back for recycling in proximity		X										
	Increasing wage level by governments or entering European Union						X						
Society	High European living costs for seamstresses salaries											X	

Note: Bolded barriers are not mentioned by existing studies (Table II). ^a, ^bSpecific information in each barrier

Table VII.

Regarding the environmental dimension, two managers had doubts whether transportation by truck from proximity manufacturing locations is actually more environmentally friendly than by boat from distant manufacturing locations. The other barriers are lack of certified European factories for fair-trade cotton (DNIM) and the conflicting framework of Swedish laws for collecting used garments (FAS3). As stated by FAS3's manager, the infrastructure is "not there really yet to recycle the textile big scale and, so far, the legal framework in Sweden doesn't really allow [for it]."

Regarding recycling programme or circular economy, there is an attempt to use proximity manufacturing in Turkey for recycling used or unsold garments (FAS2). However, the lack of infrastructure for collecting the garments, as well as double taxation for bringing back the recycled garments from Turkey to Sweden when Turkish manufacturers are used for proximity re-manufacturing, serve as barriers.

Barriers to proximity manufacturing also arise from existing company efforts and resources for overcoming the difficulties in dealing with distant manufacturing. Professional agents from big corporate groups, production/purchasing/buying offices and in-house factories in distant locations help overcome collaboration problems between headquarters and distant manufacturers. Moreover, hiring local employees at each production office to deal with local suppliers helps eliminate cultural differences. Using technology such as video conferencing and techniques such as providing suppliers with detailed garment samples companies transfer ideas or solve problems with distant suppliers. These companies' resources drive distant manufacturing and reduce the benefits of proximity manufacturing in terms of similar culture or the ease of visiting proximity suppliers for good collaboration and operations control.

5. Discussion

The findings are consistent with existing literature on proximity manufacturing in that most enablers and barriers relate to the business dimension, especially the profit, as well as service and delivery, aspects, rather than the environmental and social dimensions (Sirilertsuwan *et al.*, 2018). The most-mentioned enablers in Table VI that are in common with prior research (Table I) are short lead-time, fast replenishment, short transportation times, meeting product specifications and accessing high product quality. Moreover, the findings show that a relative reduction in transportation costs, production problems and risks from currency fluctuations and delays possibly leads companies to have reshoring to be in proximity to their main markets and headquarters. An interview study on other industries by Hofmann and Gregory (2018) reveals the same benefits of proximity-to-market and proximity-to-headquarter manufacturing as this paper in terms of innovation, rapid prototyping and fitting, customization and timely delivery for high service level to customers.

Unsurprisingly, the most-mentioned barrier is high production costs in Europe in relative to Asia or Africa. According to prior research, costs are the main driver of offshoring (Kinkel and Maloca, 2009; Gray *et al.*, 2017) and the most important factor of manufacturing decisions (Macchion *et al.*, 2015). Offshoring manufacturing in distant locations during the past decades has led to low employment in the clothing industry in advanced countries (Bolisani and Scarso, 1996), lack of industrial structure for some certain garments in the USA (Gray *et al.*, 2017) and the risk of local-management and labour shortage in Central and Eastern Europe (Ellram *et al.*, 2013). Though the context of prior studies may differ from the context of this paper in terms of time and/or countries, the incidents of lacking industrial structure and seamstresses, shown in this paper as the second and third most mentioned barriers to proximity manufacturing, seem to be similar.

Besides confirming prior research, this paper offers some unique insights and details that other studies do not. For example, this paper fulfils the lack of studies on how proximity manufacturing is able to enhance consumer health in the social dimension

(Sirilertsuwan *et al.*, 2018). The findings demonstrate that proximity manufacturing enables managers to easily visit suppliers to control the whole supply chain, allowing them to follow EU chemical laws in order to produce non-contaminated products for consumers, as well as traceability. This enhances not only business sustainability through reputational risk avoidance (Srai and Ané, 2016), but also environmental and social sustainability through non-harmful chemicals wastes and safe products. Hence, besides regulating the labour rights and minimum wages for workers, governments may improve social sustainability by setting laws to regulate chemical use in the manufacturing process to ensure non-contaminated products for consumer health as well as less chemical exposure to workers and environments. Interestingly, updated chemical laws can urge material and product innovation as clothing managers seem to take into account local European laws when considering new product development. Additionally, the findings show that the managers overlooked energy sources and filtration technology of factories which were often mentioned by European studies (Table I). Therefore, they may consider these factors for improving environmental sustainability.

In contrast to the studies of Bolisani and Scarso (1996) and Gray *et al.* (2017), this paper shows that companies manufacture complex and high-fashion garments, which typically require many operations minutes, in distant locations due to a relative cost reduction, higher labour skills and technology. Furthermore, the relative cost difference between material and operational cost of products influences managerial decisions of where to produce the products. If the cost of fabric is higher than the cost of sewing a garment (i.e. fewer operations minutes), the garment is likely to be produced in proximity to the European market. Therefore, besides supplier specialisation implying high-quality products, the cost structure of garments (materials and labour costs) also serves as criteria for manufacturing location decisions.

Besides benefits on production control and quality inspections (see Table I), this paper offers additional benefits from the ability to visit suppliers easily. The findings reveal that visiting suppliers face-to-face results in quick finalisation of price and style, leading to faster production. Moreover, managers can describe new styles of development and specifications directly to manufacturers, leading to quick sample development, which helps shortening the total lead time. Furthermore, this paper reveals that understanding company values from cultural closeness by proximity manufacturers enables not only smooth operations, but also product innovation and development. Moreover, Swedish managers in 2017 were concerned about environmental and social aspects, while US managers in 1980s interviewed by Forney *et al.* (1990) were purely concerned about the business aspect and wanted government bodies to relax laws concerning environmental and social restrictions. This finding shows the importance of time and location contexts and the contribution of this paper in confirming and updating knowledge in the field.

This paper points out common factors possibly being both enablers and barriers of proximity manufacturing. Close collaboration and relationships with suppliers can be viewed as enablers or barriers depending on whether companies have already developed relationships with proximity suppliers or distant suppliers. In addition to having headquarters in proximity to the supply chain, companies can overcome communications and collaborations problems as well as achieve environmental and social monitoring by possessing certain resources and capabilities. The resources include creating production offices, implementing communications technology and technique, operating successful business for a long time and having good long-term relationships with suppliers. These hinder proximity manufacturing if the companies choose to use the resources and capabilities in distant locations. In addition, the oversight of developing a new relationship with European suppliers possibly comes from the existing collaboration with distant suppliers or production offices.

Other factors possibly being either enabler or barrier are trade policies, political risk, availability of vertical suppliers and specialized and high-quality suppliers, and legal framework for environmental practices. Future research may further study each previously-mentioned factor in detail to draw specific examples of each factor for supporting proximity manufacturing for TBL sustainability. Another factor is the proximity between fabric suppliers and garment suppliers: when the fabrics are sourced in Europe, proximity manufacturing is preferred to avoid shipping fabrics and garments back and forth, resulting in lowered carbon emissions, lead time and costs. Therefore, a fabric sourced from a European supplier enables proximity manufacturing. On the other hand, if a fabric is produced in Asia, distant manufacturing is preferred. This leads to an interesting finding for another type of proximity manufacturing besides proximity between product suppliers and markets/headquarters: the proximity between product and material suppliers. Large delivery sizes of materials and products are also an enabler for manufacturing close to customers or next stage manufacturing locations.

6. Conclusions

This paper investigates factors under TBL enabling and hindering labour-intensive companies in high-cost countries to pursue proximity manufacturing, based on within-case and cross-case analysis of data gathered through 12 interviews of different Swedish clothing companies. Common enablers of proximity manufacturing among the companies are supplier specialisation, short lead time and fast replenishment. Common barriers are expensive European production costs and lack of industrial structure and seamstresses in Europe.

In addition to these top common factors, which were mentioned in prior research, this paper revealed further factors not previously presented. Enablers discovered in our study are: costs structure of garments (expensive materials with few operations minutes), ease of supplier visitation for price and style discussion leading to quick sample finalisation and production aside from inspection and production control, and chemical laws for product development and social compliance. Surprising barriers are: inability of companies to look for European suppliers, long-term collaboration with distant suppliers, production offices with local people, no recycling infrastructure and concern regarding high living costs for European seamstresses. The findings also present different perspectives of managers from prior research regarding environmental and social laws. Furthermore, this paper highlights how proximity manufacturing can fail to achieve well-known benefits in short lead-time and fast replenishment because of long sample development time by proximity suppliers and complex garments without proper strategies to sell the same styles for many seasons and to use forecast-planning tools for material preparation.

This paper demonstrates three types of proximity manufacturing influencing TBL sustainability: proximity-to-market, proximity-to-headquarter and proximity-to-materials. This paper also reveals the importance of the proximity between material and garment suppliers for saving costs, reducing lead time, and lowering carbon emissions, as well as for being both enabler and a barrier depending on where companies source fabrics. Other factors possibly being either enabler or barrier are: trade policies, political risks, supplier relationship, vertical or specialized suppliers' availability and environmental legal framework. Finally, companies who have headquarters, manufacturing and markets in proximity to one another can successfully achieve effective communication, as well as social and environmental monitoring, with suppliers.

7. Implications, limitations and future research

It is important for all supply chain management practitioners and scholars to take into account that short distance from proximity manufacturing benefits not only

time-to-market, fast replenishment, decreased transportation cost and time and low carbon emissions but also ease of visiting proximity suppliers. The ease of visiting suppliers for fast sample development and controlling the whole supply chain ensures on-time delivery, high-quality and non-harmful products, as well as good factory compliances leading to TBL enhancement.

7.1 Managerial implications for companies

The findings of this paper potentially help companies identify the criteria for proximity manufacturing. To guarantee achieving short lead-time from proximity manufacturing, companies should carefully select suppliers who can shorten the total lead-time from sample development until product delivery. Moreover, companies who want to achieve fast replenishment may consider having a high portion of basic never-out-of-stock or carry-over-style garments which helps order and stock materials easily with less risk because of less items number and continuous production over many seasons.

7.2 Social implications for policy makers

As governments influence TBL, policy makers have the potential to enhance sustainability by supporting proximity manufacturing to be more competitive than distant manufacturing. Government may create favourable trade policies, vocational training, European chemical laws for product development, good environment and people health as well as laws and infrastructures for recycling and the circular economy in which proximity manufacturing can play an important role. Moreover, governments can support proximity manufacturers' capabilities to be competitive in terms of vertical production, level of quality and specialisation and acquisition of sustainability-related certificates.

In order to increase garment manufacturing in Europe, the governments should support European textile production in terms of variety, quality and quantity because most companies focus on proximity between fabric suppliers and garment suppliers. European governments may also create a platform gathering European manufacturers showing their specialisation and contacts because some companies do not have resources to look for European suppliers.

7.3 Research limitations and future research directions

Though this qualitative research reveals unexpected factors from practices different from existing studies, the findings are limited to specific country and industry contexts. Therefore, enablers and barriers ought to be further explored in other countries and industries in order to see common and different reasons for proximity manufacturing and to possibly generalise proximity manufacturing decisions towards TBL among different contexts.

In future research, factors presented in this paper can, for example, be important inputs for manufacturing location decisions modelling and creating performance measures for selecting sustainable manufacturing locations and suppliers. Moreover, future research may further investigate possible correlations explored in this study. If companies have the high level of materials control, do they source materials in Europe and focus on the importance of the proximity between materials suppliers and finished-product suppliers? Do their products have higher price positioning? If companies have high level of supply chain control, do they source materials in proximity to headquarters and/or to finished-product manufacturers? And finally, what are the effects on the consumer of proximity manufacturing and the end consumer?

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