Kim *et al. Fash Text (2016) 3:7*
DOI 10.1186/s40691-016-0059-8

Fashion and Textiles

RESEARCH Open Access

Comparisons: women's garments manufacturing cost survey between Korea and China

Myoung-Ok Kim[1], Youn Hee Lee[2], Lilian Parreiras Martins[3] and Yingyu Wen[4*]

*Correspondence:
wyy1968@zstu.edu.cn
[4] Zhejiang SCI-Tech University, Hangzhou, China
Full list of author information is available at the end of the article

Abstract

This study aims to survey general information from garment factories in South Korea and China, representing, respectively, a developed country and a developing country. Additionally, within the same two countries, the study surveys garment manufacturing costs, from low to high, for a both a "basic" as well as for a "detailed" blouse, pants, and jacket (total of six items), with a goal of determining of an estimation of manufacturing cost in 2018. The results showed that there were meaningful differences between South Korea and China, as expected. Significant differences were shown in the number of employees, monthly wages, effecting factors on the lowest cost price period for a year; garment manufacturing time, and manufacturing costs of basic designs and detailed designs of blouse, pants, and jacket. The results of garments cost were significantly different consistent with the quality, from low cost to high cost, and quantities, from 500 pieces or less to above 10,000 pieces. The overall cost difference between two counties was about 2.6–3.5 times greater (Korea to China). Examining the same item, the difference was larger in low quality and small or large quantity rather than high quality and medium quantity. Interestingly, pants and jackets showed the largest cost difference at quantities above 10,000 pieces. Also, for 2018 there were differences in the estimated costs between both countries. The estimated cost differences were increasing from 2013 giving the implication that future manufacturing cost could increase between Korea and China.

Keywords: Women's wear, Global sourcing, Garment manufacturing cost, Blouses, Pants, Jackets

Introduction

Marketplaces require firms to find suppliers who can provide quality products at the best value; not only just for low costs, but also for other aspects such as speed of delivery, business practices, lower tariffs and so on. The fashion business needs to reflect the vigorous changes that have occurred with current fashion trends. Hence, fashion suppliers need to find the right place and right time for supplying garments using either domestic production or global production depending on market's environment.

There could be no doubt that firms participate in global sourcing so as to save manufacturing costs even though the global sourcing has several difficulties. For example, these difficulties are language barriers, cultural differences, long periods of delivery time,

small production compared to domestic manufacturing, the tariff process, and so on (Chen et al. 2007). Global sourcing then moves from the developed country to the developing country since the manufacturing of garments is a labor intensive production. An estimated cost savings from 10 to 40 % is known to have resulted from global sourcing (Frear et al. 1992). This research, however, was conducted two decades ago, which does not reflect current manufacturing cost trends.

It is well known that many Asian countries offer an abundance of relatively cheap and reasonably skilled labor, offering attractive sourcing opportunities (Frear et al. 1992). Among these Asian countries, Korea and China are important countries to compare in the textile and apparel industry. According to the WTO (World Trade Organization) International Trade Statistics, China, a developing country, has been ranked first in textile and apparel exports from 2010 to 2012. Despite rising labor costs, reminbi (RMB) appreciation, and lower demand from export markets, China's textile industry is still growing at a healthy pace and looks to dominate the global apparel sector, both as a producer and as a consumer for years to come (Apparel Technology 2014). In comparison with other Asian textile and apparel players, even though Korea ranked eighth regarding textile and apparel exports in 2010–2012, as a developed country, it is also an important. In the past, Korea was a player in the international textile trade that saw its fortunes shift with the elimination of the EU textile quotas in 2005 period. That shift resulted in the plummeting of textile exports from $18.8 billion in 2000 to $11.6 billion in 2009. Korea made a comeback by growing the number of free trade agreements (FTAs) with their trading partners. It has also led to its diversion in trade, replacing exports to the U.S. with imports from China (Apparel Technology 2014).

Due to the interest in global sourcing, there has been researches regarding global sourcing (Cho 1998; Cho and Kang 2001; Jin 2004; Lane and Probert 2006; Lee and Chen 2007; Shelton and Wachter 2005). However, there has been little attention given to the current manufacturing costs between a developed country and a developing one. Therefore, the researchers selected Korea as a developed country and China as a developing country to survey the garment manufacturing costs in women's wear. To offer practical information to potential future fashion market users, this study was designated to survey manufacturing garment costs in Korea and China. Large and well-established firms already possess their know-how, however, new and smaller firms have yet to develop it, so this study would facilitate decision making of manufacturing garments.

This study seeks to survey general information from manufacturing factories, to survey garment manufacturing costs from low to high for a basic and for a detailed blouse, pants, and jacket (total of six items), and to gain an estimated 2018 manufacturing cost reflecting economic indicator. In this research, comparing the domestic manufacturing cost (excluding the material pricing of outsell fabric, lining, interfacing, and threads) between Korea and China are chosen as an initial step to identify indicators to make a decision for global sourcing. Through this research, each country's domestic manufacturer's costs have been individually assessed, enabling the future buyer to plan garment manufacturing orders. By utilizing the results from this study, the buyer can, at the same time, estimate a reasonable price ahead of their market season.

Literature review

Apparel and textile industry in Korea and China

The apparel industry has unique features of market instability, subjective criteria, limited automations and computerization combination using inferior technologies compared to other industries, as well as a wide variety of products from basic to fashion items. Also, apparel production requires a more intensive labor than other industries; production in lower-wage countries can save a significant portion of production costs compared to other industries. While the entry barrier of apparel production tends to be low compared to other industries, it requires the highest level of management technologies (Jin 2004).

It has historically been argued that the modern textile industry including garment manufacturing is suited to early economies and plays a key role in the initial industrialization process. This is due to its labor-intensive demands plus a low prerequisite level of technology (Kelegama 2009). Using this labor-intensive industry, many developed countries have achieved their modern society and have become advanced countries. Korea is one of these countries that have a well-developed production, marketing structure, and a powerful export influence on global markets in the apparel sector (Son and Kenji 2013).

Korea ranked eighth in textile exporting and ranked fifth in fiber exporting world side in 2013. These static figures were slightly increased from 2012 because of FTA with partner countries (Korea Federation of Textile industries 2014). Even though it is not easy to make a comeback the glory of decades ago that Korea had established in the textiles and apparel industry, Korea still shows strong static figures and has focused on the high value production applying high-tech skills in the industry. Due to a policy package to boost the textile & fashion industry, the Korean textile and fashion industry is broadening its position in the world, which is intended to promote the industry through joint private-government initiatives. This policy includes strengthening research and development, increasing manpower, promoting South Korean brands, establishing regional business infrastructures, and taking advantage of FTA opportunities (Textile World Asia 2011).

Korea is an extremely important market as one of the fashion leading counties with a high level of interest in fashion. Sleek, trendy, cutting edge, creative, elegant, and bold, are all words that describe fashion in Korea. For Korea, fashion is very much a part of the culture. According to research done by McKinsey and Company, Korea's luxury goods market is worth $4 billion annually or 4 percent of the global market and it is expected to continue growing. Or, putting another way, Korea purchase about one-third of the luxury items as a world's second largest luxury market with significantly smaller population comparing China (The Peninsula 2013). Furthermore, due to the Koreans' great taste for premium brands and fashion trends, the Korea market became a test market earlier than its mass production.

In the previous three-year period, China, on the other hand, geographically close to Korea, is conversely ranked first in the world in the textiles and apparel export sector. Along the growth of textile and apparel exports, China's domestic market is flourishing rapidly, as well. After decades of wearing Mao suits, Chinese men and women opened their eyes from the Zhongshan suit (中山装, zhōngshān zhuāng), to the Chinese version of a Western business suit also known as the Mao suit. As China underwent its

modernization period, women began to experiment with fashion. With this experimentation, China is expected to become the largest fashion market within the next 5 years (The World of Chinese 2013).

In the 21st century, the Chinese economy entered a phase of rapid development. China's apparel industry ushered in a wide range of major developments. Simultaneously, China's fashion market accelerated the process of globalization with big international brands entering China. They began to develop commercial activities in depth from Beijing, Shanghai, and other big cities. The garment manufacturing industry is the main upwelling of its fashion industry. Despite of the global financial crisis, Chinese high-end clothing consumption remained in rapid growth ("China's fashion industry" 2014). In addition to this, China will also cultivate high value-added brands to serve the international fashion market. Expected are big changes made by Chinese companies launching China brands that, in the future, will bring China to lead the fashion industry (Reinach 2005).

However, China's apparel sector is not without challenges. Various speakers have observed that China faces a sluggish internal demand and a decrease in export orders along with rising labor costs, labor shortages in coastal provinces, and the appreciation of the RMB, the official currency of the People's Republic of China. This has led to the growth of textile and apparel exports in other Asian countries, especially Bangladesh, Vietnam, India and Cambodia. However, China will remain the leading textile and apparel sourcing country. There is no other country or region that will be able to match China in terms of scale, infrastructure, efficiency, expertise and stability. The total export figure is still growing despite high material costs and RMB appreciation ("Opportunities and Challenges" 2014).

Global sourcing and domestic sourcing

Since global sourcing is an important topic for the apparel industry, it is also important to know and understand all the factors that are involved in global sourcing and also learn how to deal with the problems that can emerge. Once a firm decides to purchase product from overseas, the firm must decide how and when sourcing "talks" will be conducted. Global sourcing requires several important tasks and has unique challenges. Many studies show that the main reasons for global sourcing is to improve critical areas for cost reduction, quality and availability, and to acquire high quality products with a low cost, besides the fact that the only way to have a specific product is to look for foreign sources (Cho and Kang 2001). But, at the same time, buyers must deal with the differences in culture, language, business practices, and the underlying infrastructure such as the transportation system, the political and economic situation, and various laws (Cho 1998). Other challenges and risks can also be due to distance, lack of technology, capacity of foreign sources, lack of knowledge of foreign business practices, and so forth (Cho and Kang 2001).

However, the dilemma is that, although global sourcing can reduce the production cost, it cannot simultaneously ensure agility. Domestic sourcing can lower inventory costs and increase customer service, but it can incur high production costs (Jin 2004). One example of how some aspects can influence the global sourcing practice is the case of supply chain models between UK and China, where they realized that the language

barrier was a major problem for pattern makers and sample makers to understand what buyers were requiring for. This case shows clearly that human factors such as deficiencies in design specification, language barriers, and cultural/human barriers (individual personal performance) were identified as aspects that inhibit performance for supply chain organizations (Chen et al. 2007).

As a solution, Shepherd (1997) suggested mixed sourcing strategies classifying apparel products according to 'seasonal changes' and 'fashionability'. Developing countries may be good sourcing locations for the low-commodity fashion category, while domestic sourcing may be preferable for high fashion goods that require short run production, on-time delivery, and those that immediately respond to trends. However, there exists a different study with 113 US apparel manufacturers responding, showing that companies with large sales volumes produce a significant amount of globally sourced fashion-oriented apparel products. Companies with small sales volumes that focus on basic items tend to source domestically (Jin 2005).

Traditionally, domestic sourcing has been used due to of several benefits despite high cost. Some retailers and designers say they prefer having their clothes made in the U.S. because it gives them a better handle on quality control and a quicker turn around on getting samples and in moving items to the sales floor. There are some signs that U.S. apparel manufacturing may be making a small comeback. That domestic source has since proved to be a winning formula for the fast-fashion chain, helping it be more nimble to get the latest trends to its stores. Domestic sourcing, especially local sourcing, respond rapidly to its brand while vendors who use overseas suppliers often have a long period of lag time in getting products to its buyer (Kumar 2013).

Methods

Data collection

The researchers collected data after contacting the company representatives prior to visiting each of the twenty-two factories (total of forty four) in Korea and China. These twenty-two companies were the manufactures of the major brand garments located in Seoul (Korea), and Hangzhou (China). The sampling procedure involved contacting the brand directors to establish factory contact information. After having contact information, we made factory visits to conduct interviews. The selected factories were manufacturing women's garments for their purchasing companies at the time of visiting, September 2–November 30, 2013. The questionnaires were made whilst reviewing previous research (Eum 2012; Lee and Chen 2007). For example, to survey the manufacturing cost, the researcher showed each design flat representing basic designs and detailed designs of a blouse, pants, and jacket. The prices were divided into three categories (low cost, middle cost, high cost) which could be produced according to the product quality at the surveyed factories. Also, the cost was determined by five categories according to a quantity since the quantity can be used as a negotiating tool.

The manufacturing cost is the cost for manufacturing garment excluding material prices such as for the outshell fabric, lining, interfacing, threads and so on. Since the fabric type can be another that affects the manufacturing cost, the fabric type was controlled as cotton fabrics for blouse, and wool fabrics for jacket and pants for this research. For the design flats, the researcher pre-surveyed designers who were working

at fashion industries to select the basic designs of a blouse, pants, and a jacket plus items of a more detailed design in a blouse, pants, and a jacket. They selected one design out of the five prepared designs for each item. The selected design flats are on Fig. 1; three items for basic designs and three items of more detailed designs.

Data analysis

Data analysis for this study used SPSSWIN Ver.18.0 for the descriptive statistics (frequency and average). The descriptive statistics were performed for analyzing effect factors on the cost and on the lowest periods. The *T* test was performed for manufacturing time and for the costs of basic and of detailed designs.

Results and discussions

General information of the responded companies

The general information of responding companies are shown in Tables 1, 2. The total number of responding companies was forty four, twenty two each from Korea and China.

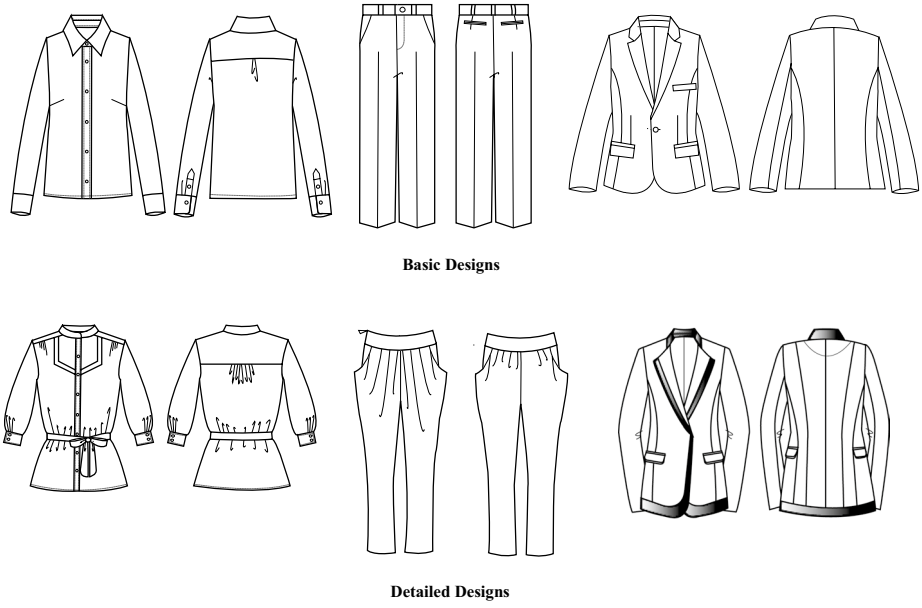

Fig. 1 Basic and detailed designs

Table 1 Job position of respondents

Job title	Korea Frequency (%)	China Frequency (%)	Total Frequency (%)
President/vice president	16 (36.4)	4 (9.1)	20 (45.5)
Design director	3 (6.8)	10 (22.7)	13 (29.5)
Product manager	3 (6.8)	4 (9.1)	7 (15.9)
Development director	0 (0)	4 (9.1)	4 (9.1)
Total	22 (50.0)	22 (50)	44 (100.0)

Table 2 General information of responding companies

Items	Country	M	S.D.	T value
Years of position	Korea	11.9	8.80	2.994**
	China	5.7	3.88	
Employee's size	Korea	23.1	8.88	3.861***
	China	192.5	205.53	
Monthly wage	Korea	$1995.82	358.27	16.315***
	China	$654.36	142.72	

Monthly wages were surveyed using the current currency of responding countries, then calculated into US dollars reflecting the exchange rate at the time the survey was conducted January in 2014

* P < 0.05, ** P < 0.01, *** P < 0.001

The job positions of the factory respondents were high in president/vice president level (36.4 %) in Korea and in the design director level (22.7 %) in China. We believe this result occurred due to the employee size that was different between two countries. Since the Korean factory size was smaller, resulting in a president's deal with the major brand buyer; in China factories being larger, resulted in a designer's deal rather than a president's deal with the major brand buyer. As expected, there were meaningful differences between Korea and China in years of seniority, number of employees, and monthly wage. The average years of seniority were 11.9 in Korea while were 5.7 in China. The average number of employees was 23.1 people in Korea while China was 192.5. Monthly wage was $1995.82 in Korea while in China it was $654.36.

Overall, the respondents in Korea were presidents or vice presidents who have an increased experience with small sized employees paying more for monthly wages. On the other hand, the respondents of China were design directors who have less experience, compared to Korea, with a large employee base receiving a small wage.

Table 3 shows the ratio of the monthly salary, 2013 per capita GDP, and estimated GDP in 2018 (IMF estimates GDP 2014) used to figure an objective economic indicator between Korea and China. As expected, there were differences when China's index was set at 1.0; Korea's index was shown to be three times higher. The monthly salary was 3.05 times higher; 2013 GDP was 3.62 times higher, and the 2018 estimated GDP was 3.35 times higher. This meant that in Korea the employee's salary in the fashion manufacturing industry was lower than the general salary because the per capita GDP in 2013 was 3.62 times higher. Estimated GDP in 2018 was 3.35 times higher since China's economy has been growing rapidly. Concerning the estimated growth percentage for 2018 compared to 2013, for Korea, it is 38.9 % increase and for China, it is an increase of 50.2 %.

In conclusion, the economic indicator between Korea and China showed that Korea was about 3 times higher than that of China.

Table 3 Ratio of monthly salary, 2013 per capita GDP, and estimated GDP in 2018

Country	Monthly salary	Ratio	2013 per capita GDP	Ratio	2018 estimated per capita GDP	Ratio	Estimated growth percentage (%)
Korea	$1995.818182	3.05	$23,837	3.62	$33,108	3.35	38.9
China	$654.363636	1.00	$6,569	1.00	$9,865	1.00	50.2

The result of the most important factor when the manufacturer took orders from the outside is shown in Table 4.

There was a difference in results shown between Korea and China. Labor cost (40.9 %) was higher in Korea which was not considered [counted (0 %)] in China, while the manufacturing cost (72.7 %) was higher in China. The second factor in Korea is the manufacturing price (22.7 %). In China, the brand name (13.6. %) and profit (13.6 %) was higher. It is the interpretation of this research that labor for the manufacturing of a garment is a labor-intensive business. China, still has the most inexpensive labor cost compared to that of Korea, the labor cost still is not an implicated issue.

Regarding the garment manufacturing cost annually, Korea's result was half and half, which meant that the garment manufacturing cost differs. However, China responded differently. 72.7 % of the factory showed that the price is not the same annually while 27.3 % of factory answered they have the same price throughout the entire year.

From this research, it is shown that the labor was not a significant factor to the garment manufacturer in China while it remained one in Korea. Also, the cost of garment manufacturing at any given point in the year differed in China. Therefore, this would be great information for the manufacturer who is considering garment production in either Korea or China.

Table 5 shows from multiple responses the lowest month/season of the garment manufacturing in Korea and China. Over all, the low cost period in Korea existed from January to December while in China there were two concentrated low periods: March–July and November–January.

In details, May (18.2 %), January (15.2 %), and December (12.1 %) were the lowest months in Korea. The possible reason is that the manufacturing time in Korea was shorter than China's, so that for the spring and summer season, most of the Korean brand factories are already set to produce their garments before May. May is the break period before the following fall season. Also, there would be a December and January break period before the spring season in Korea. However, in China, December (36.4 %) was their annual lowest month. The next lowest were January (18.2 %), July (18.2 %), and June (9.1 %). We believe that the Chinese fashion distribution channel is more complicated and manufacturing times were longer than that of Korea, causing December and January to be the break period before the following fall season. July is a short break before the following spring season.

Table 4 Effecting factors on the cost

Items	Statements	Country		Total (%)
		Korea (%)	China (%)	
Most effective factors(or crucial) on garments manufacturing (construction) price	Manufacturing price	5 (22.7)	16 (72.7)	21 (47.7)
	Reputation of brand name	4 (18.2)	3 (13.6)	7 (15.9)
	Profit	4 (18.2)	3 (13.6)	7 (15.9)
	Labor cost (price?)	9 (40.9)	0 (0)	9 (20.5)
	Total	22 (100)	22 (100)	44 (100)
Manufacturing cost around a year	The same	11 (50.0)	6 (27.3)	17 (38.6)
	Not same	11 (50.0)	16 (72.7)	27 (61.4)
	Total	22 (100)	22 (100)	44 (100)

Table 5 Lowest cost months of the year (multiple responses)

Month	Country		Total (%)
	Korea (%)	China (%)	
Jan.	5 (15.2)	4 (18.2)	9 (16.4)
Feb.	3 (9.1)		3 (5.5)
Mar.	1 (3.0)	1 (4.5)	2 (3.6)
Apr.	3 (9.1)	1 (4.5)	4 (7.3)
May	6 (18.2)	1 (4.5)	7 (12.7)
Jun.	2 (6.1)	2 (9.1)	4 (7.3)
Jul.	2 (6.1)	4 (18.2)	6 (10.9)
Aug.	2 (6.1)		2 (3.6)
Sep.	1 (3.0)		1 (1.8)
Oct.	3 (9.1)		3 (5.5)
Nov.	1 (3.0)	1 (4.5)	2 (3.6)
Dec.	4 (12.1)	8 (36.4)	12 (21.8)
Total	33 (100.0)	22 (100.0)	55 (100.0)

In summary, May and January were the lowest months in Korea and December, January, and July were the lowest in China. If the future potential garment manufacturer would consider these statistical aspects, the manufacturer could produce their garments at lower cost.

The results of the manufacturing time between Korea and China are showed in Table 6.

In general, the prototype manufacturing time in China was longer (5.5–10.5 days) than of that in Korea (3.9–7.0 days); however, in Korea the quality control sampling time took longer (3.4–7.0 days) than those in China (2.6–3.6 days). Mass production time was shorter in Korea (23.5 days) compared to China's (34.8 days). For this reason, as shown

Table 6 Garment manufacturing time in Korea and China

Items	Country	N	Mean	S.D.	T value
1st prototype	Korea	21	3.9	3.41	1.911
	China	20	10.5	15.49	
2nd prototype	Korea	4	3.1	2.66	0.746
	China	20	4.8	4.39	
3rd prototype	Korea	1	7.0		0.306
	China	18	5.5	4.86	
1st Q.C	Korea	22	3.4	2.40	0.870
	China	18	2.6	3.36	
2nd Q.C	Korea	9	4.2	3.18	0.174
	China	18	3.9	4.73	
3rd Q.C	Korea	1	7.0		0.882
	China	14	3.6	3.76	
Mass production	Korea	22	23.5	14.79	−1.981
	China	20	34.8	21.66	
Delivery	Korea	18	4.8	3.99	−2.308*
	China	19	11.6	11.77	
Total	Korea	22	37.0	21.95	−2.859**
	China	18	70.8	49.98	

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

in Table 2 the average factory sizes in China are larger; with more employees, the working environment is more conducive for mass quantity rather than small quantity manufacturing. However, the quality control sampling time was shorter than our expectation compared to the time of the prototype production.

There were meaningful differences in delivery time and total manufacturing time. Delivery time from the factory to the brand contractor was 4.8 days (Korea) and 11.6 days (China). The total Korean manufacturing time was 37.0 days while it took 70.8 days in China. We believe this occurs because the fashion industry system between Korea and China is quite different. The fashion system of Korea delivers by the private label brand system where there exists brand control in the total process. China, however, is not contractually bound to the private label brand system but to the retail oriented system. That is, after manufacturing prototypes, China held a fashion buying show to select the designs to mass produce. Depending on the results of the fashion buying show, they decide on the quantity to produce. Consequently, the total delivery time for China was two times longer than that of Korea due to the difference of the fashion distribution channel existing between the two.

Manufacturing cost of blouse, pants, and jacket

2013 basic garment manufacturing cost in China and Korea

The surveyed 2013 garment manufacturing costs for basic designs of the blouse, pants, and jacket from the low cost to high cost in Korea and China were shown in Table 7. In this research, the prices were divided into three categories (low cost, middle cost, high cost) that could be produced according to product quality and then divided into five order quantity categories at the surveyed factories. As expected, there were meaningful differences between Korea and China.

For a blouse, the average prices respectively in China and Korea were $3.42 ($3.90–$2.91); $10.95 ($13.56–$9.69) for low cost, $4.14 ($4.78–3.50); $12.32($15.34–$10.75) for middle cost; $5.24 ($6.08–$4.46); $14.63 ($17.58–12.53) for high cost. The price difference was increasing between China and Korea ($9.99; low, $10.56; middle, $11.5; high at the quantity of 500 pieces or less). The difference was decreasing, as the quantity is larger ($6.78; low, $7.25; middle, $8.07; high at the quantity above 10,000 pieces).

For a pair of pants, the average prices respectively in China and Korea were $3.64 ($4.12–$2.73); $11.31 ($13.20–$9.34) for low cost, $4.43 ($4.92–3.51); $12.75($14.74–$10.72) for middle cost, $5.52 ($6.12–$4.48); $14.57 ($16.94–11.75) for high cost. The price difference was increasing between China and Korea ($9.08; low, $9.82; middle, $10.82; high at quantity of 500 pieces or less). The difference was decreasing, as the quantity is larger ($6.61; low, $7.21; middle, $7.27; high at above 10,000 pieces quantity).

For a jacket, the average prices respectively in China and Korea were $6.25 ($6.91–$5.15); $19.28 ($21.78–$17.10) for low cost, $7.19 ($7.99–5.87); $21.18($23.86–$18.41) for middle cost, $8.68 ($9.53–$7.23); $23.57 ($26.62–$20.56) for high cost. The price difference was increasing between China and Korea ($14.87; low, $15.87; middle, $17.09; high at quantity of 500 pieces or less). The difference was decreasing, as the quantity is larger ($11.95; low, $12.54; middle, $13.33; high at above 10,000 pieces quantity).

Table 7 Manufacturing costs of the basic designs: blouse, pants, and sacket

Items	Pieces	Country	Low cost				Middle cost				High cost			
			N	M	S.D.	T value	N	M	S.D.	T value	N	M	S.D.	T value
Blouse	500 pieces or less	C	22	$3.90	1.72	15.418***	22	$4.78	2.23	14.510***	22	$6.08	3.19	12.075***
		K	22	$13.56	2.38		22	$15.34	2.59		22	$17.58	3.13	
	500–1000 pieces or less	C	22	$3.61	1.61	15.732***	22	$4.38	2.08	14.953***	22	$5.48	3.03	12.210***
		K	22	$12.62	2.15		22	$14.16	2.25		22	$16.47	2.94	
	1000–5000 pieces or less	C	22	$3.38	1.58	13.948***	22	$4.13	2.07	12.624***	22	$5.21	3.08	10.246***
		K	22	$11.32	2.15		22	$12.73	2.43		22	$14.89	3.19	
	5000–10,000 pieces or less	C	22	$3.09	1.50	12.437***	22	$3.83	1.96	11.648***	22	$4.93	2.99	9.633***
		K	22	$10.31	2.28		22	$11.66	2.46		22	$13.63	3.01	
	Above 10,000 pieces	C	11	$2.91	1.63	7.848***	11	$3.50	2.21	7.341***	11	$4.46	3.34	6.492***
		K	19	$9.69	2.57		18	$10.75	2.77		18	$12.53	3.19	
	Mean	C		$3.42				$4.14				$5.24		1.00
		K		$10.95				$12.32				$14.63		
Pants	500 pieces or less	C	22	$4.12	1.78	15.004***	22	$4.92	2.29	13.670***	22	$6.12	3.20	11.476***
		K	22	$13.20	2.21		22	$14.74	2.47		22	$16.94	3.06	
	500–1000 pieces or less	C	22	$3.84	1.62	15.446***	22	$4.63	2.15	14.189***	22	$5.72	3.04	11.705***
		K	22	$12.26	1.98		22	$13.75	2.12		22	$15.66	2.57	
	1000–5000 pieces or less	C	22	$3.60	1.61	14.510***	22	$4.35	2.14	12.847***	22	$5.42	3.05	10.269***
		K	22	$11.25	1.88		22	$12.48	2.06		22	$14.40	2.74	
	5000–10,000 pieces or less	C	22	$3.25	1.50	12.946***	22	$4.05	2.03	11.955***	22	$5.11	2.96	9.765***
		K	22	$10.14	1.99		22	$11.62	2.17		22	$13.43	2.69	
	Above 10,000 pieces	C	11	$2.73	1.40	9.213***	11	$3.51	2.01	8.387***	11	$4.48	3.10	5.271***
		K	18	$9.34	2.10		18	$10.72	2.38		18	$11.75	3.87	
	Mean	C		3.64				4.43				5.52		
		K		11.31				12.75				14.57		

Table 7 continued

Items	Pieces	Country	Low cost				Middle cost				High cost			
			N	M	S.D.	T value	N	M	S.D.	T value	N	M	S.D.	T value
Jacket	500 pieces or less	C	22	$6.91	3.19	12.638***	22	$7.99	3.88	12.549***	22	$9.53	4.99	10.939***
		K	22	$21.78	4.51		22	$23.86	4.49		22	$26.62	5.36	
	500–1000 pieces or less	C	22	$6.50	2.91	13.323***	22	$7.43	3.55	13.333***	22	$8.94	4.89	11.060***
		K	22	$20.65	4.04		22	$22.64	4.01		22	$25.18	4.85	
	1000–5000 pieces or less	C	22	$6.12	2.95	12.765***	22	$7.01	3.55	12.474***	22	$8.50	4.89	10.337***
		K	22	$19.25	3.82		22	$21.18	3.98		22	$23.28	4.58	
	5000–10,000 pieces or less	C	22	$5.74	2.80	11.950***	22	$6.65	3.43	11.746***	22	$8.08	4.73	9.981***
		K	22	$17.63	3.73		22	$19.47	3.80		22	$21.74	4.34	
	Above 10,000 pieces	C	11	$5.15	2.99	8.162***	11	$5.87	3.52	8.672***	11	$7.23	5.18	7.567***
		K	18	$17.10	4.24		18	$18.41	3.93		18	$20.56	4.23	
	Mean	C		6.25				7.19				8.68		
		K		19.28				21.18				23.57		

* P < 0.05, ** P < 0.01, *** P < 0.001

From the results of the *T* test, the cost differences were greater between Korea and China as we had expected. The *T* value showed a significant difference displaying the three star mark (***) on each cell, which meant great differences between the two groups.

2013 detailed garment manufacturing cost in China and Korea

The surveyed 2013 garment manufacturing costs for the detailed designs of the blouse, pants, and jacket from the low cost to high cost according to quantity in Korea and China are shown in Table 8. As expected, meaningful differences existed between Korea and China.

For a blouse, the average prices respectively in China and Korea were $4.58 ($5.12 to $3.93); $14.62 ($16.58 to $12.54) for low cost, $5.37 ($5.99 to 4.64); $16.18($18.31 to $13.86) for middle cost, $6.56 ($7.27 to $5.79); $18.57 ($20.84 to $15.60) for high cost. The price difference was increasing between China and Korea ($11.46; low, $12.32; middle, $13.57; high) at quantity of 500pieces or less). The difference was decreasing, as the quantity is larger ($8.61; low, $9.22; middle, $9.81; high at above 10,000 pieces quantity).

For a pair of pants, the average prices respectively in China and Korea were $4.18 ($4.67–$3.23); $12.52 ($13.95–$10.20) for low cost, $4.95 ($5.60–$3.97); $13.74 ($15.18–$11.58) for middle cost, $5.85 ($6.51–$4.63); $15.62 ($17.48–$13.41) for high cost. The price difference was increasing between China and Korea ($9.28; low, $10.28; middle, $10.97; high at quantity of 500 pieces or less), and the difference was decreasing, as the quantity is larger ($6.97; low, $7.61; middle, $8.78; high at above 10,000 pieces quantity).

For a jacket, the average prices respectively in China and Korea were $7.1 ($7.73–$5.86); $21.89 ($24.40–$20.05) for low cost, $7.97 ($8.59–6.57); $23.98 ($26.62–$21.77) for middle cost, $9.56 ($10.60–$8.10); $26.31($29.53–$23.82) for high cost. The price difference was increasing between China and Korea ($16.67; low, $18.03; middle, $18.93; high at quantity of 500 pieces or less). The difference was decreasing, as the quantity is larger ($14.19; low, $15.20; middle, $15.72; high at above 10,000 pieces quantity).

From the results of the T test, the cost differences were greater between Korea and China as we had expected. The T-value showed a significant difference displaying the three star mark (***) on each cell, which meant great differences between the two groups.

Estimated manufacturing costs for 2018 reflecting economic indicator

To discuss further, the researchers used economic indicator (2018 per capita GDP) to anticipate an increase in the estimated manufacturing cost. There could be arguments using the GDP reasonable or not because the estimation could be calculated by using the inflation of wages and/or the inflation rate. However, the future estimation for both Korean and China would have few credible economic indicators except those provided by IMF (International Monetary Fund) which is the most reliable organization regarding the economic indicator. Table 9 shows the results of the estimated manufacturing costs in 2018 for the basic designs of blouse, pants, and jacket.

To gain the estimated manufacturing costs for 2018, the researchers calculated the ratio of each item cost from the per capita GDP in 2013. Then, the researchers estimated the cost for 2018 by multiplying the estimated per capita GDP in 2018 by the ratio of each item that was calculated first in 2013. Two formulas are as follows:

Table 8 Manufacturing costs of detailed designs: blouse, jacket, and pants

Items	Pieces	Country	Low cost				Middle cost				High cost			
			N	M	S.D.	T value	N	M	S.D.	T value	N	M	S.D.	T value
Blouse	500 pieces or less	C	22	$5.12	1.87	12.137***	22	$5.99	2.36	12.217***	22	$7.27	3.24	10.562***
		K	22	$16.58	4.01		22	$18.31	4.10		22	$20.84	5.08	
	500–1000 pieces or less	C	22	$4.85	1.75	12.356***	22	$5.59	2.18	12.541***	22	$6.76	2.99	10.586***
		K	22	$15.55	3.67		22	$17.11	3.72		22	$19.70	4.89	
	1000–5000 pieces or less	C	22	$4.50	1.76	12.269***	22	$5.27	2.21	12.403***	22	$6.45	3.05	10.239***
		K	22	$14.50	3.40		22	$16.00	3.41		22	$18.48	4.59	
	5000–10,000 pieces or less	C	22	$4.19	1.75	11.276***	22	$4.93	2.14	11.662***	22	$6.12	2.99	9.932***
		K	22	$13.39	3.41		22	$14.95	3.42		22	$17.28	4.34	
	Above 10,000 pieces	C	11	$3.93	2.07	6.813***	11	$4.64	2.46	6.841***	11	$5.79	3.28	6.325***
		K	16	$12.54	3.81		16	$13.86	3.96		16	$15.60	4.35	
	Mean	C		4.58				5.37				6.56		
		K		14.62				16.18				18.57		
Pants	500 pieces or less	C	22	$4.67	2.02	12.454***	22	$5.60	2.75	10.328***	22	$6.51	3.39	10.870***
		K	22	$13.95	2.85		22	$15.88	3.77		22	$17.48	3.30	
	500–1000 pieces or less	C	22	$4.33	1.83	13.235***	22	$5.15	2.48	12.363***	22	$6.06	3.17	11.364***
		K	22	$13.07	2.50		22	$14.57	2.57		22	$16.58	2.97	
	1000–5000 pieces or less	C	22	$4.06	1.77	12.825***	22	$4.86	2.43	11.899***	22	$5.81	3.18	10.686***
		K	22	$12.02	2.31		22	$13.52	2.40		22	$15.49	2.82	
	5000–10,000 pieces or less	C	22	$3.70	1.63	12.758***	22	$4.45	2.24	11.738***	22	$5.37	2.92	10.676***
		K	22	$11.04	2.15		22	$12.54	2.33		22	$14.46	2.72	
	Above 10,000 pieces	C	11	$3.23	1.74	8.279***	11	$3.97	2.40	8.0444***	11	$4.63	3.02	7.917***
		K	17	$10.20	2.41		17	$11.58	2.47		17	$13.41	2.77	
	Mean	C		4.18				4.95				5.85		
		K		12.52				13.74				15.62		

Table 8 continued

Items	Pieces	Country	Low cost				Middle cost				High cost			
			N	M	S.D.	T value	N	M	S.D.	T value	N	M	S.D.	T value
Jacket	500 pieces or less	C	22	$7.73	3.44	13.135***	22	$8.59	3.87	13.603***	22	$10.60	5.60	11.121***
		K	22	$24.40	4.85		22	$26.62	4.86		22	$29.53	5.69	
	500–1000 pieces or less	C	22	$7.35	3.10	12.915***	22	$8.25	3.55	13.213***	22	$9.77	5.08	11.421***
		K	22	$23.04	4.78		22	$25.18	4.85		22	$27.45	5.18	
	1000–5000 pieces or less	C	22	$7.03	3.09	12.286***	22	$7.89	3.53	12.838***	22	$9.38	5.03	11.083***
		K	22	$21.72	4.68		22	$23.73	4.58		22	$25.87	4.83	
	5000–10,000 pieces or less	C	22	$6.65	2.98	12.240***	22	$7.49	3.42	12.328***	22	$8.93	4.84	10.743***
		K	22	$20.45	4.37		22	$22.55	4.60		22	$24.63	4.85	
	Above 10,000 pieces	C	11	$5.86	3.12	9.279***	11	$6.57	3.29	9.828***	11	$8.10	5.08	8.317****
		K	17	$20.05	4.39		17	$21.77	4.38		17	$23.82	4.76	
	Mean	C		7.1				7.97				9.56		
		K		21.89				23.98				26.31		

* P < 0.05, ** P < 0.01, *** P < 0.001

Table 9 Basic design: estimated manufacturing cost and differences in 2018

Cost level	Items	Country	Average cost in 2013	Cost difference in 2013	Ratio	*Ratio A (Cost/GDP)	**Estimated cost in 2018	Estimated cost difference in 2018	Differences ratio (= difference cost of 2018/2013) (%)
Low	Blouse	C	$3.42	$7.53	1.00	0.00052	5.13	$10.1	34.1
		K	$10.95		3.20	0.00046	15.23		
	Pants	C	$3.64	$7.67	1.00	0.00055	5.43	$10.13	32.1
		K	$11.31		3.10	0.00047	15.56		
	Jacket	C	$6.25	$13.03	1.00	0.00095	9.37	$17.45	33.9
		K	$19.28		3.08	0.00081	26.82		
Middle	Blouse	C	$4.14	8.18	1.00	0.00063	6.21	11.01	34.6
		K	$12.32		2.97	0.00052	17.22		
	Jacket	C	$4.43	8.32	1.00	0.00067	6.61	10.94	31.5
		K	12.75		2.87	0.00053	17.55		
	Pants	C	$7.19	13.99	1.00	0.00109	10.75	18.72	33.8
		K	$21.18		2.94	0.00089	29.47		
High	Blouse	C	$5.24	9.39	1.00	0.00080	7.89	12.31	31.1
		K	$14.63		2.87	0.00061	20.20		
	Pants	C	5.52	9.05	1.00	0.00084	8.29	11.91	31.6
		K	14.57		2.64	0.00061	20.20		
	Jacket	C	$8.68	14.89	1.00	0.00132	13.02	19.76	32.7
		K	$23.57		2.72	0.00099	32.78		

* A: Ratio of each price from per capita GDP in 2013: each cost divided by the per capita GDP in 2013.

** B is using the information from A above: the estimated cost for 2018 estimated per capita GDP for 2018 multiply by the ratio of each price from the per capita GDP in 2013.

As the estimated growth percentage in 2018 of per capita GDP compared to 2013 was increased (see Table 3) in both Korea (38.9 %) and China (50.2 %), the 2018 estimated manufacturing cost was increased as well. Consequently, the estimated cost difference of each item was also increasing from that of 2013. The increased differences shown were 31.1–34.6 %, which meant the cost differences between the two countries were increasing. Even though the manufacturing cost could be less or more than the growth of the GDP, if it is assumed that the estimate cost is within an error value, then the 2018 estimated manufacturing cost could be closer to the researchers' expectation. It was then obvious that the cost difference would significantly increase between Korea and China.

Conclusion

This study was designed to gain the practical information of garment manufacturing costs in Korea and China as a representative of a developed country and a developing country in Asia. The results showed that there were meaningful differences in manufacturing cost between Korea and China as expected. The differences were shown significantly, in the number of employees, monthly wages, effecting factors on the cost lowest price period for a year; garment manufacturing time, and manufacturing costs of

basic designs and detailed designs of blouse, pants, and jacket. Especially, the results of garments cost were specifically different according to the quality from low cost to high cost and quantities from 500 pieces or less to above 10,000 pieces. The difference was about 2.6–3.5 times in basic and detailed items. Within the same item, the difference was greater in small or large of low quality items rather than high quality and medium quantity. Interestingly, pants and jackets showed the largest difference at quantity above 10,000 pieces. Also, there were differences the estimated costs in 2018 between both countries. The cost differences were increasing from 2013 given the implication that future manufacturing cost could widen the gap between Korea and China so that Korea would fail on competition with China from the simple estimated results.

Although, there has been manufacturing movement from Korea to China, and China to less developed countries because of the increasing manufacturing cost, there is still an opportunity within each country for the lowering of labor costs. For example, China has a vast territory; there exist provinces that have low labor costs. If China uses its cheaper labor instead of depending on less developed countries, China could be a competitive power for a long time.

The results of this study have important implications. First, this study suggests that the basic designs could be manufactured at low prices since there were lowest months in manufactured garments in both countries. Second, China has an obvious competition; however, China is a low-cost developing country and less stable in the middle- or to low-end market, while Korea is stable in the high-end market.

Therefore, in the future, if the FTA is signed between Korea and China, Korea will also have a competitive edge against China. Korea can have a benefit from China's low labor cost, geographic proximity, and well prepared fashion infrastructure. According to this, future research is suggested to survey the exporters' cost of manufacturing using various cost categories within developing countries.

Authors' contributions

All authors had planned the work. MOK and PM developed the literature review and survey questionnaire. YHL and YW conducted interview questionnaire. YW guided the analysis of the results. All authors read and approved the final manuscript.

Author details

[1] Howon University, Gunsan, Republic of Korea. [2] Hanyang University, Seoul, Republic of Korea. [3] Federal University of Minas Gerais, Belo Horizonte, Brazil. [4] Zhejiang SCI-Tech University, Hangzhou, China.

Received: 27 May 2015 Accepted: 25 January 2016
Published online: 28 March 2016

References

Apparel Technology and Business Insight from Concept to Consumer. (12 Feb 2014). "Opportunities and challenges in Asia's apparel and textile sector". http://apparel.edgl.com. Retrieved 05 Apr 2014.

Chen, Z., Murry, R., & Jones, R. M. (2007). Fashion supply chain organization and management between the UK and China. *Journal of Fashion Marketing and Managements, 11*(3), 380–397.

Cho, J. (1998). *Global sourcing: benefits and challenges, and organizational governance in the apparel industry*. Unpublished doctoral dissertation. Madison: University of Wisconsin-Madison.

Cho, J., & Kang, J. (2001). Benefits and challenges of global sourcing: perceptions of US apparel retail firms. *International Marketing Review, 18*(5), 542–561.

Ecvienna Fashion. (01 Mar 2014). "China's fashion industry has a large development space". http://ecvienna.eu. Retrieved 10 May 2014.

Eum, C. (2012). A study on the global sourcing for the cut-and-sew knits of the Korean casual apparel brands. Unpublished master's thesis. Seoul: Dongduk Women's University.

Frear, C. R., Metcalf, L. E., & Alguire, M. S. (1992). Offshore sourcing; its nature and scope. *International Journal of Purchasing and Materials managements, 28*(3), 2–11.
IMF estimates GDP. (2014). List of countries by past and future GDP. http://en.wikipedia.org. Retrieved 07 May 2014.
Jin, B. (2004). Achieving an optimal global versus domestic sourcing balance under demand uncertainty. *Journal of Operations and Production Managements, 24*(12), 1292–1305.
Jin, B. (2005). Global sourcing versus domestic sourcing: implementation of technology, competitive advantage, and performance. *Journal of the Textile Institute, 96*(5), 277–286.
Kelegama, S. (2009). Ready-Made garment exports from Sri Lanka. *Journal of Contemporary Asia, 39*(4), 579–596.
Korea Federation of Textile industries. (2014). 2014 Textile industry statistics. http://www.kofoti.or.kr. Retrieved 15 Nov 2014.
Kumar, K. (2013). "Designers, retailers find benefits to having clothes made in USA". http://www.stltoday.com. Retrieved 14 Jul 2013.
Lane, C., & Probert, J. (2006). Domestic capabilities and global production networks in the clothing industry: a comparison of German and UK firms' strategies. *Socio-Economic Review, 4*, 35–67.
Lee, H. A., & Chen, J. S. (2007). Global sourcing of Korean apparel firms. *Research Journal of Costume Culture, 15*(3), 461–471.
Reinach, S. S. (2005). China and Italy: fast fashion versus Prêt a Porter: towards a new culture of fashion. *Fashion Theory, 9*(1), 43–56.
Shelton, R. K., & Wachter, K. (2005). Effects of global sourcing on textiles and apparel. *Journal of Fashion Marketing and Management, 9*(3), 318–329.
Shepheard-Walwyn, S. (1997). A vision of sourcing for a global market. *Journal of Fashion Marketing and Management, 1*(3), 251–259.
Son, M. Y., & Kenji, Y. (2013). A comparative analysis on the competitiveness of Korean and Japanese fashion industry by applying generalized double diamond model. *Asia Marketing Journal, 15*(1), 57–81.
Textile World Asia. (2011). "South Korea: raising the textile and apparel industry's standing". http://www.textileworldasia.com. Retrieved 10 May 2013.
The Peninsula. (2013). "By design: a look at Korea's fashion industry". http://blog.keia.org. Retrieved 10 May 2013.
The World of Chinese. (2013). "The fashion industry and China". http://www.theworldofchinese.com. Retrieved 20 Apr 2013.