Gaining Competitiveness via Procurement Transformation That Retains German Engineering Origin

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Abstract

With the evolution of globalization, multinational companies face increasing competition on national and international markets. As a result, they seek to implement proper strategies to maximize capacity and competitiveness. This article asks whether a multinational company in medical devices has the strategic potential to transform its procurement strategy to embrace a local sourcing concept to gain competitiveness while retaining engineering origin. Study results from the medical-device industry show that attributes delivered by German origin can improve competitiveness. A significant majority of customers see the importance in the "Made in Germany" label. Customers also tend to accept the conception of local production that retains German engineering. The medical-device industry represents several branches in areas such as quality and technology. The results of this paper address product marketing, product strategy, and decision-makers dealing with sourcing alternatives. The results suggest that the strategy of pairing local production with German engineering is desirable to enhance competitiveness.

Keywords: local sourcing, "Made in Germany", medical-device industry, customer behavior, competitiveness, business strategy, operations strategy

1. Introduction

1.1 Research Introduction

This research focuses on a typical situation of a German manufacturer of medical products acting at international level within the medical-device industry. Due to limited growth potential in the current markets, the focus lies in emerging markets. Based on the studies of Oltmanns (2013), Western companies can expect to achieve 70% of their future profits in emerging markets. Those markets have divergent customer behaviors as well as different market conditions and financial resources compared to developed markets. For internationally active medical-device companies from Germany competition has grown in recent years. Prevailing conditions of price caused by having production located in Germany, with continuous product developments fulfilling the latest quality standards, are seen as disadvantages that negatively influence competitiveness. Distance to current and future markets is also seen as an issue.

Companies within the international business world seek to achieve competitive advantages over purely domestic-market-oriented companies. The management focus is on how to minimize costs that follow local adjustments when acting abroad (Macharzina & Engelhard, 1987). The management of multinational corporations confronts two contrary requirements: first, differentiation that is strongly market-oriented and second, standardization that focuses on global integration and is therefore strongly product-oriented. Within the globalization, multinational corporations face a challenge to combine the advantages of both requirements (Prahalad & Doz, 1987). Comparing possible strategies for multinational companies, due to the disadvantages of international, multinational or global strategy within the framework for multinational corporations, only a transnational strategy would be able to exploit competitive advantages. The central objective of the transnational strategy consists in the simultaneous exploitation of national differences and company-specific advantages with resource management could be conveyed as benefits. To adapt to the global environment with a focus on gaining competitive advantages are limited to procurement and production following geographical dispersion and geographical concentration (Paul, 1998). Transnational production networks, for

instance local sourcing, allow companies to take advantage of the location and specialization benefits of individual country conditions.

This research focuses on medical products' attributes in terms of quality, technology, and price. The research also focuses on the attributes of "Made in Germany" products in terms of quality, technology, and reliability. Customers' opinion of the classification "Made in Germany" is surveyed, focusing on local sourcing options and customers' perception of foreign production quality. For a multinational corporation that follows a transnational strategy within the international business, this article addresses the possibility of relocating the production of medical products. It analyzes customers' acceptance of local production that retains German engineering and a different production environment in which product characteristics are changeable in order to meet customers' market conditions. Individual customers rate specific product and service characteristics that are typically offered by German companies for medical devices.

1.2 Literature Review

1.2.1 International Markets

The term globalization suggests, along with its technological, economic, political, cultural and ecological dimensions, benefits within global change and the advantages they offer. To understand globalization is to recognize an ambivalent relationship between convergence and divergence. While the technological, economic and political conditions unitize worldwide, clashes erupt in cultural and environmental conditions because of divergent evolutions (Welge & Holtbrügge, 2006). From the company's political point of view, globalization primarily entails opportunities and risks for companies. Companies that adapt their product strategy at an early stage to global aspects record a surge of profits, stock prices and shareholder value. Companies that continue to think and act in national categories are threatened increasingly. According to Prahalad and Hamel (1994), no industry is free from impact, and the implication is that companies need to shift from national to international activities.

Analyzing customers' buying behavior according to their needs and wants is essential to building a successful strategy. The markets of today and tomorrow are always radically different compared to the past, with new customer behaviors, challenges, possibilities and opportunities (Kotler & Keller, 2006). Along with the features of globalization, customers in the information age are able to evaluate and compare products according to their needs and wants. Reviewing the changing environment with a focus on medical products, changing technology, globalization and deregulation offer great possibilities to adjust to future concepts of procurement and production. Unfortunately, these changes will also offer opportunities to other players on the market, and new competition may even arise. That is why competitiveness and competitive advantages becomes more important for global players.

1.2.2 Competitiveness of the "Made in Germany" Label

Companies often realize economies of scope or economies of scale. Overall, a company has strengths and weaknesses, which will lead to competitive advantages. They are separated into cost leadership, differentiation and the focus on cost or differentiation (Porter, 1985). Apart from the choice of the right generic strategy, companies lose competitiveness if they do not consider a wide range of industry factors. The industry environment is permanently changing; competition becomes harder and globalization advances. To generate a strategic decision, identifying and classifying all participants within an industry is fundamental. The business environment at the time of analysis is not static, and is subject to a dynamic change going into the future that will requires a permanent strategic adaptation (Porter, 1985).

According to a multiplicity of studies and results, the country-of-origin effect has a considerable impact on product evaluation (Ahlert, Backhaus, Berentzen, & Tegtmeier, 2007). The statement of a product's origin may be used for any advertising purposes and beneficially affect the image of a product, product range or even company. That is why the term "Made in Germany" has been applied in many industries for decades, reflecting high quality, latest technology and reliability. The marking "Made in Germany" is today nationally and internationally protected. Products from Germany still enjoy an excellent reputation around the world (Ahlert et al., 2007). The term "Made in" can therefore strongly influence clients' perception of quality (Schooler, 1965). Through appropriate marketing a company name can thus become a seal of quality and affect clients' behavior in a positive way (Zimdars, 2010).

1.2.3 Sourcing Concepts

According to the categorization of Wannenwetsch (2010), there are numerous relations between purchaser and distributor along with long-term successful sourcing alternatives available (Figure 1). Which of them is the best option for the product range in focus depends on the sourcing material and on the competitiveness level. However, all of them have offer different opportunities and advantages while considering national differences, economies of scale and economies of scope.



Figure 1. Categorization of sourcing alternatives

Source: acc.to Wannenwetsch (2010).

A local sourcing has advantages in quality, lower costs and time to the market. It is preferred for component suppliers and has advantages in diversification of risk and higher flexibility. Following Figure 1, global sourcing and multiple sourcing are adequate uprating's due to the advantages of local sourcing.

Local Sourcing

The definition of local souring is a situation where a company purchases products direct from companies in the neighborhood. In this case, logistical troubles will be reduced to a very low level. Local sourcing offers especially great possibilities for premium products, offering the opportunity to use several suppliers. These secure a flexible purchaser-to-provider relationship and the production between the involved parties can be arranged simultaneously. In the automotive sector, for example, many suppliers allow the production site of the purchaser in foreign markets to be a local supplier, rather than sourcing at origin.

Table 1. Advantages and disadvantages of local sourcing

Advantages	Disadvantages
Supplier is close to the production	Less possibility to negotiate
Lower transport costs	Mostly high price
No importation taxes	Absence of international know-how
Local mentality and language	Consumer trust changeable
Advantage in the use of local currency	Implementation of foreign quality standards
Flexibility to changes	
High quality	
Sometimes better price conditions	
Sources and to Warn annuts al (2010)	

Source: acc.to Wannenwetsch (2010).

By the nature of a multinational company's organization, local sourcing from the local subsidiary point of view is linked to purchasing products from the neighborhood to respond to market-specific requirements. Thus, local sourcing offers the possibility of different supply methods for materials, products or services. Its advantages are in delivery time, delivery costs and local adaptations. Local purchasing can offer better pricing due to local price standards.

Global Sourcing

The definition of global sourcing is a worldwide acquisition of products. Throughout the internationalization of acquisition, a wider scope of sourcing is possible. In relation to advantages and disadvantages, it is essential to choose the right suppliers not only with a focus on the purchasing price, but also on the capacity.

Advantages	Disadvantages		
Worldwide choice of the best suppliers	Risk in exchange rates and currency shifts		
New product know-how	Import taxes		
Lower acquisition price	High bureaucracy		
Use of exchange contacts	Corruption		
International contacts	Different mentality and language		
Diversification of risk	Low reliability		
Lower dependency	Risk in quality		
	Risk in product patents		
	Delivery problems		

Table 2. Advantages and	disadvantages	of global	sourcing
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Source: acc.to Wannenwetsch (2010).

It has sometimes been noted in relation to deliveries from China or India that the quality of the first delivery is excellent, but the second is worse. Due to the fact that most deliveries are carried out via time-consuming freight shipping, a delivery with worse quality can interrupt the progress of production as a replacement delivery takes time and will thus cause unforeseen expenses. Within global sourcing, product patents are not observed and protected. Global sourcing is disadvantageous in low-wage countries in the case of bulk production, as well as where price advantages are higher than the risks and costs for transport.

• Multiple Sourcing

Multiple sourcing describes a situation where a company purchases identical products from several distributors. The advantages of multiple sourcing are linked to the minimization of the risk of production downtime, as well as to an increase in the competition between distributors. This is especially advantageous in the case of any price discussions. The risk level does not depend on only one distributor and its price regulation. This strategy has been used in the automotive sector for a long time, with the principle rules being not to purchase more than one-third of the demand from one supplier and that suppliers' capacity is not blocked by more than 50%. Therefore, from purchasing companies' point of view, changing supplier can yield useful advantages to control price an ensure flexibility (Wannenwetsch, 2010). Multiple sourcing provides great possibilities, especially for products with low technical specifications and high standardization. Disadvantages include high transaction costs and high purchasing costs, as well as the absence of discount options.

• Integrating Global and Local Sourcing

A multinational company, with its goal of achieving a cost-saving, efficient and flexible sourcing method, is linked to a wide variety of supplier channels, which are located across and within multiple geographical regions (Cavusgil, Knight, & Riesenberger, 2008). Global suppliers typically provide a single product to several production sites in different regions. Local suppliers in contrast typically provide a single product to a local production site (Trautmann, Bals, & Hartmann, 2009; Trent & Monczka, 2003). Global suppliers require closer

contact with local sourcing staff within the countries or regions of supply, as well as closer contact with the headquarters' sourcing staff. To successfully complete these tasks, the multinational company requires an effective coordination and communication of knowledge (Shi, Zou, & Cavusgil, 2004; Yeniyurt, Cavusgil, & Hult, 2005). Consequently, global sourcing staff will be frequently involved in any sourcing tasks that arise between the local sourcing administration and the global sourcing administration. The importance of local sourcing and global sourcing varies with the value of the company. Within a multinational company, integrating global-sourcing and local-sourcing concepts offers advantages and opportunities, but also disadvantages. This is why choosing the right concept is challenging and must be done with respect for the current conditions.

1.2.4 Sourcing Prospects

Of the sourcing methods, local sourcing offers the best possibilities for the future and can appropriately combat disadvantages of German companies acting internationally. A study by Deloitte (2012), which surveyed about 550 CEOs, provides a better understanding of global manufacturing, its trends and competitiveness. The study explores the complex forces which influence manufacturing and procurement today, and which may cause structural reshaping of the manufacturing and procurement of tomorrow. Manufacturing includes development, research, production, logistics, marketing, customer service and sales. Understanding manufacturing principles is essential to improve standards and to competitiveness for the company's product range (Deloitte, 2012). To raise the competitiveness level of a company's business with a focus on manufacturing (World Economic Forum, 2012), a wider view of strategic adjustments and decisions is required. This study includes 550 survey responses from manufacturing executives based around the world. Of the respondents, 39.7% are from North America, 28.5% from Asia, 5.4% from South America, 5.4% from Australia and about 21.0% from Europe. The most important issues shaping modern production are the creation of know-how, creativity, knowledge, capital and technology. That is why companies are facing rapid developments within their environment and need to strengthen their advantages. The study by Deloitte (2012) confirms the transformational shifts in global competitiveness in manufacturing which will redefine the parameters of a company's environment.

Current country ranking	Country ranking in five years
1. China	1. China
2. Germany	2. India
3. United States of America	3. Brazil
4. India	4. Germany
5. South Korea	5. United States of America
6.Taiwan	6. South Korea
7. Canada	7. Taiwan
8. Brazil	8. Canada
9. Singapore	9. Singapore
10. Japan	10.Vietnam

Table 3.	Country	ranking i	n manufacturing
	J	0	0

Source: acc.to Deloitte (2012).

According to the survey by Deloitte (2012), the most competitive nations will be similar to the current competitiveness rankings. The BRIC countries will rise to a higher ranking of competitiveness for manufacturing. Equally, the CEOs believed in China's prospects of maintaining its current leading position. The results provide a deeper insight into the competitive challenges for both emerging and developed nations that wish to achieve prosperity and sustainable economic growth. Global manufacturing competitiveness is important for a company's strategies to achieve their growth aims in the right production location. The choice of the correct production site within developed or emerging nations is influenced more by company-specific, manageable and controllable issues than by governmental or national disadvantages, such as infrastructure. The top 10 current

and future production nations will remain largely as they are, with only the BRIC countries gaining more international interest due to their attractive cost situation for materials and labor. Internationally active companies face a fast-changing environment and need to adjust their competitiveness level permanently. Companies will face problems of scarcity of and competition for material resources. Thus, strategies for competition need to adapt to the changing environment. Success in the long term will depend on discovery of alternative materials or elements and a more efficient application in terms of use and delivery (World Economic Forum, 2012). In particular, critical earth resources show a tendency of increasing prices correlated with decreasing availability. The prospects for the future related to critical resources demonstrate that their availability is crucial for innovation. Therefore, a long-term strategy for companies' manufacturing needs to be redefined to find substitutes or to inspire materials-science innovations. In addition, the availability and consumption of energy influences manufacturing. For companies with rising energy consumption, energy prices rise simultaneously, and this becomes a top priority for overall costs, especially manufacturing costs. The management of energy consumption influences competitiveness and becomes more important for a company's strategy planning in terms of the way it designs its products, improves its operation level and adjusts its supply chains (World Economic Forum, 2012). Equally, analyzing the aspects of increasing energy costs, companies have opportunities to adjust their strategy to increase their competitiveness through different manufacturing and procurement concepts. Improvements in the efficient operational level can generate efficient product design and guide modern production methods, or lead to an efficient supply chain.

2. Method

2.1 Research, Methods and Sampling

The central question is how multinational companies from Germany can actually create and sustain competitiveness for medical devices within the healthcare sector, focusing on local sourcing while retaining German engineering quality. Traditionally, the three oppositions are "scope", "time" and "cost"— the "magic triangle", where each side of the triangle illustrates a constraint (Chatfield & Johnson, 2014). Affecting one of these constraints will affect the other constraints. Translating the magic triangle model to the aspect of local sourcing within the medical-device industry, a similar model can be developed, as illustrated in Figure 2.



Figure 2. Triangle of constraints

The constraint "cost" covers the aspect of growing competition and its pressure on price. The product price is built on the reputation and attributes suggested by the label "Made in Germany"; for example, a production site located in Germany will follow high quality standards and regulations. In short, "Made in Germany" is basically synonymous with "quality", and therefore affects price. The constraint "time" covers the aspect of transportation time that exists with a German production site that serves international markets as the only source.

Any possible product adaptation would take all three elements into consideration, such as price, quality and time. As illustrated in Figure 2, these all influence each other. For instance, a cheaper material can positively or negatively affect delivery time, price and quality. Therefore, specific adaptation is not possible and some specific questions need to be addressed in order to assess the importance of these different aspects when accepting local production and retaining German engineering quality. From company's point of view, the product requires some

key product adaptation factors. These factors are, from the customer's point of view, key-purchasing factors. With regard to medical devices' characteristics with regard to ISO 13485 (Note 1), adaptation in price, quality and time is possible in several dimensions. With regard to the survey carried out in this research, six dimensions can be distinguished that demonstrate from both customers' and companies' points of view the current product-specific disadvantages for medical devices (Figure 3).

Current disadvantages	Importance to customers		
Product priceMismatch in local standardsAbsent local support and service	 Importance of lower pricing Importance of adapting to local standards Importance of having local support and services 		
 Different quality standards of manufacturing German quality standards Adaptation to different/cheaper materials 	 Importance of a local implemented certified production Importance of German quality standards Importance on having the same material classification 		

Figure 3. Current disadvantages and important points for customers

To respect customers' preferences while pairing German engineering with local production, a transfer of these six dimensions is required in a way that considers their individual levels of importance in order to evaluate product adaptations correctly. Therefore, a further transformation of the six dimensions in terms of their importance to customers can be outlined (Figure 3). The less importance attached to one of these dimensions, the easier it is to adept product characteristics that influence the factors of the magic triangle of price, quality and time.

This research study was conducted according to the paradigm of positivism through a dedicated questionnaire, which generates a high reliability, usually by testing hypotheses using a large sample size (Collis & Hussey, 2009; Kumar, 2014). This research focuses on medical devices within the healthcare sector, targeting the aspects of cost, quality and time related to the term "Made in Germany". In the scope of a multinational corporation, the aim is to enhance competitiveness through a different procurement conception that considers future market conditions. The primary data collection was conducted at the MEDICA exhibition in Germany in November 2013, via face-to-face interviews. The MEDICA exhibition is one of the world's leading fairs in healthcare. Due to its location in Germany, it was expected that the majority of respondents would be from Europe. The sample size was defined according to Krejcie and Morgan (1970), with N = 362 (100.0%) positive responses. To answer the research questions, the primary data collection was limited to international customers; German natives were sorted out. Since there are different customer and market behavioral aspects to observe, a pre-selection of customers' origin is considered, arranged by region. These regions are: North America, Central and South America, Western and Central Europe, Eastern Europe and Russia, Middle East and Gulf Countries, Africa, Australia and Asia.

2.2 Hypotheses

Following customers' buying preferences with regard to the magic triangle, the disadvantage of products classified as "Made in Germany" is the high price. The transportation time and delivery costs are disadvantageous. While retaining the positive quality attributes of "Made in Germany", a local sourcing concept can combat these disadvantages actively. This concept changes the real "Made in Germany" into a concept of "Engineered in Germany", paired with local sourcing. Unfortunately, it is not clear whether customers attach as much importance to "Made in Germany" as German companies traditionally do.

(H1) Hypothesis:

The classification "Made in Germany" is for customers purchasing medical products perceived as important.

This hypothesis depends on the interdependency of the importance customers attach to the classification "Made in Germany" and the product-specific attributes it delivers. Based on the rating scale of importance in scientific frameworks (Kumar, 2014), it is expected that over 75% of customers will choose "very important" and "important".

In the context of a local-sourcing concept, it is not clear whether the foreign production site's conditions will have an equal level of quality compared to German sites.

(H2) Hypothesis:

Compared to a German production site, a foreign production sites are perceived with an averaged quality.

This hypothesis depends on the interdependency of local production quality with the advantages delivered by a local-sourcing concept and customers' opinion of the quality delivered by "Made in Germany". As mentioned above, customers appreciate German quality, and the quality level of "Made in Germany" is familiar to them. Thus, it is expected that the foreign production quality will be rated average.

Pursuing the advantages offered by globalization, most German companies have launched or will launch a production site abroad to realize better strategic opportunities. This is mostly related to global change and the fact that companies try to act simultaneously in different markets, close to or far away from their origin. Unfortunately, it is not clear whether customers will accept local production of medical products classified according to ISO 13485.

(H3) Hypothesis:

There is a positive relationship between the acceptance of retaining German engineering origin coupled with a local production.

To transform the concept of a real "Made in Germany" into a concept of "Engineered in Germany" paired with a local procurement strategy, this hypothesis assumes the interdependency of companies' strategy and customers' acceptance of local sourcing. A positive response of 95% is expected.

It is unclear whether customers require product adaptations where a local production site is accepted. Therefore, adaptation factors need to be addressed to respondents related to their importance, as illustrated in Figure 3.

(H4) Hypothesis:

There is positive relationship between the acceptance of the concept retaining German engineering origin coupled with a local production and the importance to adapt specific product characteristics.

This hypothesis assumes the interdependency of medical products related to the product's adaptation attributes when accepting a local sourcing concept. It is expected that all six purchasing factors will have an "average" rating.

3. Results

This empirical study conducted at MEDICA 2013 is limited to the healthcare sector for medical devices, following the classification of ISO 13485 for designing and manufacturing medical products. On the basis of the previously defined random sample for the MEDICA exhibition, the participants in the focus of the survey are limited to international respondents related to the research problem and acting in the healthcare sector. Responses from German citizens have been sorted out. Total responses of N = 636 (100.0%) have been collected; respondents' origins are illustrated in Figure 4. Due to the exhibition location in Germany, it was expected that a majority of respondents would be from Europe.



Figure 4. Respondents' origin

With regard to the first hypothesis (H1), the responses to question 1 (Q1) are illustrated in Table 4.

Q1: How important is the classification MADE IN GERMANY for you?	No. respondents	
Very important	121 (19.0)	
Important	309 (48.6)	
Neither important nor unimportant	140 (22.0)	
Unimportant	56 (8.8)	
Very unimportant	10 (1.6)	
Total	636 (100.0)	

Note. Figures in parentheses are percentages.

Out of a total response of N = 636 (100.0%), the label "Made in Germany" is rated as "very important" by n = 121 (19.0%) and "important" by n = 309 (48.6%), a total of 67.6%. Thus, the results do not agree with hypothesis 1 (H1). The median is 121 and the arithmetic mean 127.2. Ratings of "important", "very important" and the remaining responses arranged by respondents' origin is illustrated in Figure 5.



Figure 5. Importance of Made in Germany

Responses to question 2 (Q2) related to the second hypothesis (H2) are illustrated in Table 5.

Table 5. Results, question no. 2

Q2: How do you rate the quality of your local production compared to Germany?		No. respondents	
Excellent	78	(12.3)	
Above average	160	(25.2)	
Average	237	(37.3)	
Below average	126	(19.8)	
Poor	35	(5.5)	
Total	636	(100.0)	

Note. Figures in parentheses are percentages.

Respondents tend to rate the quality level of their foreign production compared to German production quality as "average".

Figure 6 shows the responses of "average", "above average", and "excellent", as well as the remaining responses, arranged by respondents' origin.



Figure 6. Local production quality

With the focus on the major research question regarding customers' acceptance of local production of medical devices, the responses related to the third hypothesis (H3) via question 3 (Q3) are illustrated in Table 6.

Q3: Would you accept a product with the label "Engineered in Germany", but locally		
produced?	No. res	spondents
Yes	573	(90.1)
No	63	(9.9)
Total	636	(100.0)

Table 6. Results, question no. 3

Note. Figures in parentheses are percentages.

According to hypothesis 3 (H3), it was expected that 95% of respondents would accept the principle of local production paired with German engineering. As seen in the chi-square distribution table with df = 1 the p-value is > 0.05. The results are therefore not significant, and customers accept the local-sourcing concept for medical

devices with only n = 573 (90.1%) out of a total N = 636 (100.0%). The arithmetic mean is 318. Figure 7 illustrates the relation of responses arranged by respondents' origin.



Figure 7. Local production acceptance

Table 7 illustrates responses to question 4 (Q4) that asked about the importance level of specific key product characteristics when accepting local production and retaining German engineering for medical products following the fourth hypothesis (H4).

Q4: How important are the following key purchasing factors for you, in case of a local production?									
Product		high <		Importance		> low			
characteristics		****	****	***	**	*	Total		
Lower price	#	(13.2)	(16.9)	(27.0)	(38.6)	(23.8)		median:	110
	n	247	242	110	32	5	636	mean (Q3=Yes):	4.09
	*	(38.8)	(38.1)	(17.3)	(5.0)	(0.8)	(100.0)	p-value:	0.96
Adaptation to	#	(17.3)	(16.9)	(14.0)	(12.0)	(14.3)		median:	57
local standards	n	324	242	57	10	3	636	mean (Q3=Yes):	4.36
	*	(50.9)	(38.1)	(9.0)	(1.6)	(0.5)	(100.0)	p-value:	0.15
Local support	#	(17.0)	(16.7)	(15.7)	(18.1)	(0.0)		median:	64
and service	n	319	238	64	15	0	636	mean (Q3=Yes):	4.36
	*	(50.2)	(37.4)	(10.1)	(2.4)	(0.0)	(100.0)	p-value:	0.55
Certified production	#	(17.6)	(16.0)	(15.0)	(14.5)	(23.8)		median:	61
	n	330	228	61	12	5	636	mean (Q3=Yes):	4.35
	*	(51.9)	(35.8)	(9.6)	(1.9)	(0.8)	(100.0)	p-value:	0.16
German quality standards	#	(18.6)	(15.4)	(14.5)	(7.2)	(14.3)		median:	59
	n	348	220	59	6	3	636	mean (Q3=Yes):	4.43
	*	(54.7)	(34.6)	(9.3)	(0.9)	(0.5)	(100.0)	p-value:	0.47
Same material classifications	#	(16.4)	(18.1)	(14.0)	(9.6)	(23.8)		median:	57
	n	308	258	57	8	5	636	mean (Q3=Yes):	4.35
	*	(48.4)	(40.6)	(9.0)	(1.3)	(0.8)	(100.0)	p-value:	0.77
Total	#	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)		

Table 7. Results, question no. 4

n 1876 1428 408 83 21 3816

* = row percentage; n = responses; # = column percentage.

Note. Figures in parentheses are percentages.

Following the responses related to changeable product characteristics, there is no detectable relationship between acceptance of local production following question 3 (Q3) and the importance of product characteristics for medical products following question 4 (Q4). The p-value of all sub-categories is > 0.05 and responses are therefore not significant. However, a comparison of these characteristics is possible based on the mean value of importance for responses. As illustrated in Figure 8, a lower price is rated as less important compared to others, among respondents who are prepared to accept local production following question 3 (Q3).



Figure 8. Mean value of product characteristics according to question Q3 = Yes

4. Discussion

Multinational companies acting in the healthcare sector for medical devices need to combine two different requirements: first, differentiation, and second, standardization. The simultaneous pursuit of both advantages is possible through a transnational strategy. A transnational production network can make use of the benefits of location and specialization in individual country conditions. Globalization therefore offers opportunities—but also risks. Permanent adaptation to the changing environment is necessary. The marketplace of tomorrow will be totally different to today. Due to the future conditions caused by customers and markets, new challenges and opportunities arise. Possibilities for different production concepts exist that also reflect future aspects. Unfortunately, this causes acceleration in competition, so that internationally active companies need to ensure their competitiveness. The classification "Made in Germany" has an excellent reputation around the world, and this is a boon for German companies. Country-of-origin identification in this instance has a positive influence on customers' perceptions. The classification "Made in Germany" suggests attributes of high quality, cutting-edge technology and reliability.

Local sourcing combats prevailing product disadvantages and offers advantages in diversification. For any strategic decision with regard to sourcing alternatives, it is important to analyze future production conditions

from all aspects. Efficient operations lead to efficient product design, manufacturing methods and supply chain. But the customers' point of view also needs to be considered. In this research, the label "Made in Germany" was rated by 67.7% of respondents as "very important" or "important". Unfortunately, the results do not confirm the first hypothesis (H1). With regard to the second hypothesis (H2), the quality of foreign production sites compared to German quality of production is rated as average. In relation to the third hypothesis (H3), local production that retains German engineering quality is accepted by 90.1% of all respondents. However, the p-value is > 0.05 and the response rate is thus not significant; therefore, the hypothesis is not confirmed. The product adaptation characteristics related to the fourth hypothesis (H4) were rated as having a high level of importance. It is possible to compare the six product adaptation characteristics by the mean value. Of those respondents who accept the idea of a local production concept following the third hypothesis (H3), lower price is less important than other characteristics.

4. Conclusion

In conclusion, the classification "Made in Germany" is not as important as suggested in the literature for the medical-devices industry-one of the top-ranked industries in Germany (DIHK, 2014). The aspects of quality, time and price for medical products from Germany deliver some disadvantages. International respondents rate their local production quality as average. This could mean that respondents are not familiar with the quality of products with the classification "Made in Germany" in this sector, or that respondents have different product requirements than are provided through local sourcing, so that the quality of "Made in Germany" products remains respected and required. It was found that a majority of respondents would accept the conception of local production retaining German engineering. This means either that they believe in the suggested concept of German engineering paired with local production, or they want to promote overall economic growth in their country.

In terms of this research's scope, local sourcing offers strategic opportunities within the medical-device industry while retaining German engineering origin. Customers' opinions and behavior constitute a major focus of this research. A permanent adaptation of companies' strategy to consider future market conditions and the behavioral change of markets and customers is required. Local sourcing concepts offer possibilities, but also risks that need to be considered. In any way reducing the perception of "Made in Germany" quality may affect the turnover.

The medical-device industry represents several branches in areas such as quality and technology. The results here address both companies' strategic decision-management related to benefits delivered through alternative sourcing opportunities, and the marketing related to brand management and product strategy along with efficient use of country-of-origin identification. In the context of the changing environment and future conditions of customers and markets, the results of this study suggest that the strategy of pairing local production with German engineering is desirable to enhance competitiveness.

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Note

Note 1. ISO 13485: 2003: International standard for design and manufacturing medical products.

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