

Article

Sustainable Fashion Supply Chain: Lessons from H&M

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Abstract: Sustainability is significantly important for fashion business due to consumers' increasing awareness of environment. When a fashion company aims to promote sustainability, the main linkage is to develop a sustainable supply chain. This paper contributes to current knowledge of sustainable supply chain in the textile and clothing industry. We first depict the structure of sustainable fashion supply chain including eco-material preparation, sustainable manufacturing, green distribution, green retailing, and ethical consumers based on the extant literature. We study the case of the Swedish fast fashion company, H&M, which has constructed its sustainable supply chain in developing eco-materials, providing safety training, monitoring sustainable manufacturing, reducing carbon emission in distribution, and promoting eco-fashion. Moreover, based on the secondary data and analysis, we learn the lessons of H&M's sustainable fashion supply chain from the country perspective: (1) the H&M's sourcing managers may be more likely to select suppliers in the countries with lower degrees of human wellbeing; (2) the H&M's supply chain manager may set a higher level of inventory in a country with a higher human wellbeing; and (3) the H&M CEO may consider the degrees of human wellbeing and economic wellbeing, instead of environmental wellbeing when launching the online shopping channel in a specific country.

Keywords: supply chain; sustainable fashion; fashion operations; sustainability

1. Introduction

Global textile consumption is estimated to more than 30 million tons a year, which causes seriously social and environmental impact within supply chain [1]. Sustainability issues are crucial to the fashion industry [2]. In the pursuit of low production costs, apparel firms took advantage of lower environmental

awareness and looser environmental regulatory system in developing countries [3]. Fashion brands such as Benetton, Adidas, and C&A are blamed to develop their supply chain unsustainably [4]. Many fashion companies recognize the importance of sustainability in business and incorporate green practices into their supply chain. Examples of this kind of fashion companies include H&M, Uniqlo, The North Face, and New Balance.

Fashion industry has huge impacts on global environment [2]. The demand to minimize the environmental pollution is not only from fashion firms but also consumers [5]. From the fashion firms' perspective, because the production process in fashion is particularly sensitive to environment in terms of making intensive use of chemical products and large quantities of water and pesticides, it is significantly important for fashion products to be produced in a sustainable manner and follow the guideline of sustainability such as ISO 14000 [6]. From the fashion consumers' perspective, consumers are growing to have social and environmental awareness. Consumers' environmental attitudes directly influence their eco-fashion consumption [7]. They understand that if supply chain is more sustainable, more natural resources are used and less CO₂ are emitted, in return, retail prices might be also increased [8]. Previous studies reveal that fashion consumers are interested in purchasing sustainable fashion products and also willing to pay a higher price as long as the quality of eco-product is satisfied [5,9,10].

In this paper, we focus on introducing the operation structure of sustainable fashion supply chain and learning the lessons of sustainable practices in the prestige fashion company H&M. H&M is a Swedish multinational fashion company with about 3100 stores across 53 markets. H&M launched the sustainability program, which is called as "Conscious Action" [11–15]. In this program, broadly speaking, more job opportunities in less developed countries are created, more recyclable resources are used in production and consumers are educated to be more ethical [14,15]. As a result, market and supply chain are turning to be more economically, environmentally, and socially sustainable. However, H&M also faces a number of challenges throughout the sustainable supply chain. Challenges and conflicts of being more sustainable and profitable are present at each stage of supply chain, including material production, garment manufacturing, transportation/distribution, consumer education, and retailing.

As a famous global brand, H&M is sufficiently representative to examine the sustainable fashion supply chain. Our objectives in this paper are: (1) to identify the structure of sustainable fashion supply chain; (2) based on the structure, to investigate the sustainable operations at H&M; (3) to discuss the lessons of H&M's sustainable fashion supply chain from the country perspective. Our paper is different from that of Li *et al.* [11]. They focus on examining the impacts of corporate social responsibility behavior on the sustainability performance of H&M.

The organization of the rest of this paper is given as follows. We first show the related literature of sustainable fashion supply chain in Section 2. A case study of H&M is presented in Section 3. Section 4 discusses the lessons of sustainability of H&M from the country perspective. This article ends with conclusions in Section 5.

2. Literature Review in Sustainable Fashion Supply Chain

According to the World Commission on Environment and Development [16], sustainability is defined as "development that meets the needs of the present without compromising the ability of future

generations to meet their needs". The new concept of sustainability is the "Triple Bottom Line", which consists of social, environmental and economic performance aspects [17]. The Sustainability Society Foundation (SSI) has well-defined the three aspects of Triple Bottom Line: human wellbeing refers to social performance, which includes basic needs, personal development, well-balanced society; environmental wellbeing includes healthy environment, climate and energy, and natural resources; economic wellbeing is related with preparation for future and economy [18]. Fashion supply chain is labor-intensive and sensitive to environment and society, it is crucial for fashion firms to build up a sustainable supply chain, which covers all aspects of Triple Bottom Line [11].

Sustainable fashion attracts considerable attention from scholars and industrialists in the area of textile and supply chain management [19]. Sustainable fashion supply chain includes eco-material preparation, sustainable manufacturing, green distribution, green retailing, and ethical consumers [10]. An effective sustainable fashion supply chain helps companies to enhance brand image and reach a wider range of ethical consumers [20]. As a result, for firms, being sustainable is a way to promote their responsibility to society and environment so as to gain the competitive advantage in the market [21]. For consumers, purchasing sustainable fashion as human psychological needs is a way to express their attitudes of equality and sustainability [22]. A sustainable fashion product is made in an environmental and social friendly manner along supply chain, which includes raw material production, manufacturing, distribution, and retailing.

First, eco-material production is the fundamental part in sustainable fashion supply chain. Sustainable fashion products are often made by organic fabrics, which are produced by less water and harmful chemicals [8]. A well-known company that produces organic fabric is Hong Kong-based Esquel, the world's leading producers of premium cotton shirts. Esquel compensates farmers on production of organic cotton in China, because farming organic cotton causes crop yields to drop by as much as 50% [23], and requires a continuous control of product and information [24]. In addition, reuse and recycling of materials, such as old clothes, manufacturing scraps and bottles also can be the material of sustainable fashion [25]. Recycling is very popular in the fashion industry [26]. British fashion brand Marks & Spencer launched a special suit line, which is made of recycled materials [27]. Moreover, in order to be more sustainable, many fashion brands, such as Nike, Marks & Spencer, and Timberland, engage in developing the biological textile production [8]. In the USA, biological agricultural systems are widely adopted in cotton production [28].

Sustainable manufacturing is related with human right and environmental protection. Dickson [29] reveals that consumers are now increasingly concerned about the social consequences of their purchases in relation to human rights violations in apparel manufacturing. In recent years, garment factories in Bangladesh frequently were fire hazards, with serious consequence, due to poor conditions in facilities and less training of workers [30]. The disaster of the Rana Plaza building on 24 April 2013, might change the behavior of apparel sourcing companies regarding building and fire safety for sustainable manufacturing. However, in fact, the fashion industry also incurs many kinds of negative impacts on environment in all stages of garment manufacturing [8]. Concern for the environmental impact of apparel manufacturing is important, as the Earth is not able to support the current level of production and disposal of apparel due to depletion of natural resources and quick filling of landfills [31]. More seriously, complicated fashion items, such as shoes and winter jackets, may not be recycled or biodegradable, in other words, once they are thrown away they would be in landfill for hundreds of

years [8]. In order to show the evidence of firms' achievement in environmental management and sustainability, firms often verify the practices of sustainable manufacturing via third parties. Many fashion firms have differentiated their products and strengthened their brand image by adopting sustainable practices, such as ISO 14000 standard, in their supply chain [32]. Verifying the certification of ISO 14000 implies firms have established their environmental-related operations and work flows in their manufacturing processes [33–36].

Sustainability is also considered in the distribution phrase. Distributing fashion products is complex and dynamic, as fashion is stylish and perishable with a short life cycle. Nagurney and Yu [3] develop a novel model to capture manufacturing, transportation, and shortage in fashion supply chain with consideration of reducing the emission. Their results reveal that the supply chain performance is influenced by adopting environmental pollution-abatement technologies in distribution. Lead time is the key of quick response strategy in a fast fashion. Quick response requires a short lead time, which implies that the firms should choose an efficient transportation mode. It is, hence, crucial for a fast fashion to consider carbon emission issues in terms of its feature of a quick response. However, it is inevitable that transportation incurs carbon emission, associated with the fashion and apparel industry, especially given its global dimensions in terms of both manufacturing plant locations and demand markets [33]. Choi [37] develops an analytical model to discuss how a properly designed carbon footprint taxation scheme can be implemented in a fashion quick response system to enhance environmental sustainability. His findings imply that sourcing locally might be more desirable for fast fashion retailers under carbon footprint taxation scheme.

Green retailing is beyond the link between green products and marketing. It is important to pay attention to clustering user experience and rethinking value creation [38]. Innovation of sustainable fashion product should be targeted to ethical consumer markets. In recent years, consumers have an increasing awareness of sustainability. The concept of sustainability is important in marketing and branding, since it can strengthen customer interest and loyalty [39,40]. A great deal of existing literature has shown that consumers are willing to purchase eco-fashion products if green marketing is successful [5,7,41]. In addition, in green retailing, ethical practices, such as offering recycling service and recyclable product in stores, can enhance fashion consumer awareness of sustainability [7]. From the product perspective, Joergens [42] emphasizes that sharing the information of a product's sustainability is important in retailing. A product's sustainability includes all aspects of supply chain, such as the manufacturing processes and pollution reduction [7]. In other words, more transparent information sharing towards sustainability in supply chain is more desirable for consumers. Beard [43] suggests that releasing sustainable information of a new collection on the Internet is useful for promoting eco-fashion brands. Fraj and Martinez [44] claim that consumers are increasingly interested in purchasing eco-fashion, but they lack of corresponding information, as a result, providing the sufficient information in terms of eco-material, sustainable manufacturing, green distribution, and green retailing, help eco-products to be promoted better among consumers.

3. Sustainable Operation Practices at H&M

In the previous section, the literature of the sustainable fashion supply chain is widely discussed. In order to have a clear picture that how fashion companies work sustainably, in this section, we

conduct a case study of H&M. Case study is a well-established research method in business studies. A case study of a supply chain offers the opportunity to look at its complex links and underlying implications [45,46]. In this study, data were collected from multiple resources, such as the company's website, annual sustainability reports [12–15], news media and government statistics, *etc.* This method of data collection in a case study can help to enhance the reliability of the findings [47]. Li *et al.* [11] use a similar method to examine the supply chain of H&M. However, our case study examines the different perspective of H&M's sustainable supply chain compared with Li *et al.* [11].

3.1. Eco-Material Preparation

Cotton, as a renewable resource, is the main material for apparel production. However, chemicals and pesticides are largely used in the traditional ways to grow cotton. For example in U.S.A., the largest exporter of cotton in the world, a quarter of all the pesticides used are in the production of cotton [31]. Organic cotton is grown without using pesticides or synthetic fertilizers, which could reduce the negative impact on the environment. According to an interview with Henrik Lampa, corporate social responsibility (CSR) manager of raw material at H&M, with the increasing awareness of environmental sustainability, H&M has used organic cotton for many years and invested a great deal of money on sustainable cotton production [14]. Moreover, in order to guarantee that the cotton farms produce real organic cotton, H&M actively involves the global project, called Better Cotton Initiative (BCI), which provides the better farming techniques to cotton farmers. H&M aims to use 100 percent of its cotton from more sustainable sources by 2020 [15]. In Spring 2014, H&M will offer the Hollywood glamour collection, which is made of organic cotton and recycled polyester [48]. Moreover, H&M cooperates with the World Wide Fund for Nature (WWF) in the strategy to save water, which helps improve the management of water resources throughout the textile production cycle.

H&M aims at sending zero waste from the organization to landfills. Recycled materials are popularly used at H&M. In addition to recycled cotton from textile remnant in production, H&M also uses recycled polyester, recycled polyamide, recycled plastic, and recycled wool in product lines. The advantages of using these recycled materials include saving energy and water, as well as lowering the greenhouse gas emission. In order to ensure the standard of sustainable materials, H&M is certified by independent third party certification for each category. For instance, organic fabric is certified by Global Organic Textile Standard (GOTS) and recycled ones are certified by Global Recycling Standard (GRS).

Moreover, H&M launches an old garment collection program, under which three kinds of collected garments are categorized: (1) Re-wear (clothing that can be worn again is sold as second-hand goods worldwide); (2) Reuse (textiles that are no longer suitable to wear and converted into other products, such as cleaning cloths); (3) Recycle (textiles that cannot be reused can be turned into textile fibers or used to manufacture products such as insulating materials for the auto industry) [14,15].

3.2. Sustainable Manufacturing

Apparel manufacturing often takes place in countries with low labor costs. However, in those countries, the awareness of environment and human rights are often less developed. H&M promotes the importance of fair working conditions and environmental performance. H&M provides detailed information about its suppliers, which are usually disclosed by many fashion brands. According to the

data collection from the list of suppliers at H&M, Bangladesh is the main manufacturing country for H&M (there are 163 suppliers in Bangladesh working for H&M, as shown in Table 1). However, fire safety is significantly potential hazard for Bangladesh garment factories [49]. In order to reduce the negative impact on manufacturing, H&M takes many initiatives with Bangladeshi suppliers, including monitoring factory compliance and providing training to suppliers and their workers [15].

Moreover, according to the data obtained from H&M official website, as of May, 2013, H&M has 1058 suppliers across 23 countries. Consistent with the strategy of locally sourcing in Asia and Europe, China and Turkey are the main countries for its manufacturing, with 262 suppliers and 194 suppliers, respectively. Local sourcing reduces the lead time, which benefits in matching supply and demand and adopting a quick response strategy. What is more, local sourcing reduces the amount of product leftovers and carbon emission in the process of production and distribution. As a result, this strategy, not only can ensure a timely inventory supply in response to quick market demand changes, but also reduce unnecessary production and carbon emission.

3.3. Green Distribution

Producing carbon emission is inevitable in distribution. However, the question is how to design a more efficient transportation system, and minimize the amount of carbon emission in distribution. According to H&M's annual sustainability reports [12–15], it was estimated that more than half of the carbon emission at H&M are due to transportation from factories to stores. After recognizing this environmental consciousness, efficient and clean modes of transport are used to reduce this negative impact at H&M. Ferry and train are relatively clean modes in transportation [8]. At present, shipping via sea or rail is the main mode of H&M's transportation from supplier to distribution centers (more than 80% of the volume). In return, amount of carbon dioxide decreases over 700 tons a year. If road transport has to be used, H&M provides a training course to the truck drivers and does not use the trucks which have been used for more than 10 years. In order to reduce associated emissions, H&M built up an intelligent transportation system for direct shipments, which avoided intermediate warehouses, decreased the volumes shipped via ocean and air by 40%, and increased the volume of products shipped by rail. Furthermore, in order to reduce the waste, in 2011, H&M implemented an energy and resource management software system which is enabling major advances in environmental data collection and analysis [13]. H&M customizes the transport packing, each way, from production countries to distribution centers, according to the quality and environmental requirements. In addition, when garments are transported from distribution centers to retail stores, transport boxes are always reusable.

3.4. Green Retailing

H&M launched the clothing conscious collection initiative worldwide in 2013 and promotes sustainable concept in ethical consumers in retailing [15]. Consumers can return the old apparel products (any brand and any condition) to all H&M stores across 54 countries. In return, consumers can get a 15% off coupon for their next purchase. By offering rewards, less ethical consumers are encouraged to return the old apparel products. Green retailing was successfully launched at H&M, as shown in Figure 1. In 2013, customers brought in 3047 tons of used clothing, such as new jeans made of recycled fibers [15].

Figure 1. Pictures of Conscious Collection Initiative at H&M stores (Photos are from Internet).



The returned items are handled by I: Collect, a global commercial company specializing in textile recycling. More specifically, at H&M, there are collection boxes arranged by I: Collect. I: Collect guarantees that all collected used apparel and textiles will be optimally recycled according to their condition. Moreover, the company adopts an up-cycling process, in which some textiles and fabrics are reprocessed and used to create commercial products. As a result, because of this initiative, consumers can, not only receive the discount when purchasing products at H&M, but also save natural resource and contribute to reduced environmental impact by avoiding textile waste. All information related to this initiative is transparent to consumers via their official website, and all revenue from this initiative is used to fund the customer coupons, donate to local charities, and reinvest in H&M's sustainability initiatives. Therefore, this is a win-win-win strategy, namely, consumer, H&M, and environment, all receive benefits.

4. Lessons of Sustainability at H&M from the Country Perspective

4.1. Lessons of Supplier Selection

We examine the relationship between the number of suppliers in a specific country of H&M, and its corresponding sustainable society index (SSI) with a statistical approach. Provided by SSI in 2012 (SSI is updated every two year, thus, 2012 version is the most update one by now [50]), 151 countries' sustainability are ranked regarding human wellbeing, environmental wellbeing, and economic wellbeing. Table 1 shows the data of H&M's suppliers and SSI. The results are shown in Table 2 (All data of H&M are retrieved from H&M website and SSI website in May 2015. In data analysis, we mainly focus on major supplier countries in which there are more than 10 suppliers. As a result, Egypt, Greece, Latvia, Netherlands, Poland, Sweden, Tunisia, Ukraine, Thailand and Pakistan are excluded). We find that the human wellbeing ranking is positively statistical related to the number of suppliers at H&M in a specific country ($\beta = 0.469$, $p = 0.024 < 0.01$). This implies that H&M are less willing to select suppliers in countries with higher levels of human wellbeing. This result provides lessons for supply chain managers of H&M, who might more likely to select suppliers from countries with lower

levels of human wellbeing. This is consistent with the current practices of apparel sourcing in countries such as Bangladesh, India and China, where the degrees of human wellbeing countries are relatively low [51,52].

Table 1. Suppliers at H&M and sustainable society index (SSI).

Country	No. of Suppliers	Human Wellbeing	Environmental Wellbeing	Economic Wellbeing
Bulgaria	27	33	104	39
Egypt	4	48	117	65
Greece	3	27	120	105
Italy	65	25	83	25
Latvia	1	42	50	14
Netherlands	2	8	124	18
Poland	1	26	105	17
Portugal	18	23	82	72
Romania	24	50	81	23
Sweden	3	3	73	2
Tunisia	5	49	114	43
Turkey	194	69	113	27
Ukraine	4	62	121	53
Cambodia	34	110	5	75
China	262	98	80	50
Indonesia	56	85	53	64
Korea	37	24	127	20
Thailand	1	71	55	42
Vietnam	11	83	60	70
Bangladesh	163	107	62	81
India	104	116	65	103
Pakistan	8	115	61	93
Sri Lanka	31	61	29	57

Table 2. Statistical relationship between the no. of suppliers in a specific country, with H&M and its SSI.

	R Square	Adjusted R Square	F-Value	Standardized Coefficients Beta	T-Value	Significance
Human wellbeing	0.220	0.183	5.916	0.469	2.432	0.024 *
Environmental Wellbeing	0.003	-0.044	0.066	-0.056	-0.257	0.800
Economic Wellbeing	0.011	-0.036	0.233	0.105	0.483	0.634

* <0.05; ** <0.01. Dependent variable: number of suppliers in a specific country.

4.2. Lessons of Sales per Store with Human Wellbeing

According to the 2013 annual report at H&M in Table 3, we can see that H&M sold the best in Germany (SEK 26206 million) in 2013, followed by the USA (SEK 13675 million) and France (SEK 10636 million). The result of No. of stores are similar to net sales, where Germany (418) has the largest number, followed by USA (305) and UK (245). All of Germany, France, and the UK are relatively high in human wellbeing. After running the linear regression model, we find that there is no statistically significant relationship between SSI and financial performance of directly owned stores in 2013 (financial performance of direct own stores refers to sales, the number of stores and sales per store in a specific country), except in sales per store regarding human wellbeing. We find that the human wellbeing ranking is negatively statistically related to sales per store (R square = 0.098, t -value = -1.803 , $\beta = -0.313$, p -value = $0.081 < 0.1$), rather than economic wellbeing (R square = 0.001, t -value = -0.195 , $\beta = -0.036$, p -value = $0.847 > 0.1$) and environmental wellbeing (R square = 0.029, t -value = -0.953 , $\beta = -0.172$, p -value = $0.348 > 0.1$). In other words, this finding implies that the sales per H&M store are higher in a country with a higher human wellbeing. This finding provides lessons for supply chain managers that, in higher human wellbeing countries, preparing a higher inventory level in a store might be more desirable due to potentially high sales per store [53–55].

Table 3. Sales performance at H&M in 2013.

Country	Sales 2013	No. of Stores 30 November 2013	Sales per Store	First Store
China	6655	205	29.0	2007
Japan	2945	39	71.8	2008
Malaysia	379	7	54.1	2012
South Korea	810	16	46	2010
Austria	4821	72	55.8	1994
Belgium	3445	73	39	1992
Bulgaria	264	11	20	2012
Croatia	704	13	43.3	2011
Czech Republic	834	38	18.1	2003
Denmark	4612	97	38.0	1967
Finland	2529	58	35.4	1997
France	10,636	204	43.5	1998
Germany	31,140	418	62.6	1980
Greece	981	27	29.5	2007
Hungary	792	33	18.9	2005
Ireland	616	19	27.5	2005
Italy	5490	116	39.0	2003
Luxembourg	386	10	34.6	1996
Netherlands	6750	130	42.93	1989
Norway	5535	114	38.87	1964
Poland	3193	122	21.29	2003
Portugal	918	27	27.6	2003

Table 3. *Cont.*

Country	Sales 2013	No. of Stores 30 November 2013	Sales per Store	First Store
Romania	893	28	25.7	2011
Russia	2566	51	43.2	2009
Slovenia	373	13	23.9	2004
Spain	6011	156	32.0	2000
Sweden	8257	177	37.5	1947
Switzerland	5516	87	58.7	1978
Turkey	721	20	33.0	2010
Canada	3024	66	41.1	2004
USA	13,675	305	42.6	2000
UK	10,256	245	36.0	1976

Net sales are shown by million SEK. 1 SEK = \$0.145 USD (5 August 2014).

4.3. Lessons of Launching Online Stores

Based on the data collected from the H&M website, H&M has launched online stores in ten countries (*i.e.*, Austria, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, the USA, and the UK). Recall that shopping from online stores is sustainable because of saving public energy and resources [43]. Launching online stores is beneficial to the green retailing, which could cluster user experience and create the business values [56–59]. As shown in Table 4, those ten countries are all ranked relatively high in the context of human and economic wellbeing (except the USA) and relatively mild in the context of environmental wellbeing. This observation implies that the H&M CEO may, mainly, consider the degrees of human wellbeing and economic wellbeing, instead of the environment when launching the online distribution channel (*e.g.*, developing the online and offline channel together) in a specific country.

Table 4. Country ranking of sustainable index regarding the existence of online stores at H&M.

Country	Human Wellbeing	Environmental Wellbeing	Economic Wellbeing
Austria	5	70	11
Denmark	17	126	34
Finland	4	103	8
France	11	99	37
Germany	10	107	22
Netherlands	8	124	18
Norway	2	94	3
Sweden	3	73	2
USA	32	125	102
UK	15	89	36

5. Conclusions

Consumers awareness of sustainability, regarding environmental pollution, is increasing. As a way to promote sustainability, developing a sustainable supply chain is an important strategy for many fashion companies. In this paper, we focused on examining a sustainable fashion supply chain and we took H&M as our industry example. We first studied the structure of a sustainable fashion supply chain and revealed how H&M works in the corresponding stage of the sustainable fashion supply chain. We observe that H&M has implemented a sustainable program, Conscious Action, in which eco-material is used and promoted, the sustainable manufacturing manner in countries with a high sustainable consciousness is adopted, green distribution approaches with less emissions and energy use are used, and green retailing and educating consumers are promoted. In addition, based on statistical analysis, we learn that (1) H&M's sourcing managers may be more likely to select suppliers in countries with lower degrees of human wellbeing; (2) H&M's supply chain manager may set a higher level of inventory in a country with a high human wellbeing; and (3) the H&M CEO may consider the degrees of human wellbeing and economic wellbeing, instead of environmental wellbeing when launching the online shopping channel in a specific country.

Although literature review and case studies help the industrialists to better develop a sustainable fashion supply chain, there are several limitations in this paper. First, this paper selects only four major topics regarding a sustainable fashion supply chain, which may not be exhaustive. For future research, more details in a sustainable fashion supply chain should be explored. Second, in the case study, H&M is sufficiently representative to show how a fashion company adopts sustainable practices in a supply chain. However, a fashion supply chain is complex and dynamic. One company cannot represent the whole of the fashion supply chain. For future research, the topic of a sustainable fashion supply chain should receive prolonged attention.

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Conflicts of Interest

The author declares no conflicts of interest.

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