



MACROJOURNALS

The Journal of **Macro**Trends in Energy and Sustainability

SUSTAINABILITY AND CLEANER PRODUCTION: CASE OF TEXTILE AND CLOTHING SECTORS IN BİNGÖL

Muhsin TAN*, **Emrah AYHAN****, **Mahmut BAYDAŞ*****

**Department of Business Administration, Bingöl University, Bingöl-TURKEY,*

***Department of Public Administration, Bingöl University, Bingöl-TURKEY, emrahayhan@hotmail.de*

****Department of Business Administration, Necmettin Erbakan University, Konya-TURKEY*

Abstract

In this study, the terms of sustainability and cleaner production are analyzed in the light of recent changes occurring in the world. Environmental and economical concerns have recently been increased and this necessitates the implementation of sustainability into the production processes. In this direction, most of the businesses create new strategies in order to implement sustainability and cleaner production into their production processes. The aim of this study is to investigate the importance of sustainability and cleaner production, and demonstrate economical and environmental benefits in textile and clothing sectors in Bingöl. Firstly, the study deals with the explanation of sustainability and cleaner production in terms of development, efficiency, waste reduction, minimizing cost, clean technology and pollution prevention etc. Secondly, a comparison of two companies in the clothing sector Bingöl is made by the case study approach. Their capabilities and performance in sustainable and cleaner production are evaluated. Finally, the study shows how these companies implement sustainability and cleaner production into their production processes by giving conclusions. In addition, some recommendations are made in order to increase capabilities and performance of companies in textile and clothing sectors in Turkey. The research shows that it is necessary to increase the awareness on how significant sustainable and cleaner production for the current and future generations. In this situation; society, firms and states have to be responsible for this issue because there is a need for cooperation between them.

Keywords: *sustainability, cleaner production, production process, Turkey, textile and clothing sectors*

1. Introduction

The world economy is now more integrated because national economies turned into market economies due to international production and capital flows across the national borders (Ayhan et.al. 2016). Therefore, competitiveness and efficiency issues in different sectors are now more important than they were before. In line with these developments, textile industry is also developing constantly in line with needs. In addition to the expected increase in textile production in the world, sustainable and environmentally friendly production technology also attracts attention. The most important step in this context is the need to develop sustainable and cleaner production activities primarily in textiles. European countries have implemented quality standards on this issue. In this context, European Technology Platform organized an international symposium titled as "Planning the Future of Textile Research and Innovation in Europe" for the future of the textile and clothing sectors. In this symposium, participants agreed on some predictions about the future of textiles which are given below (BUTEKOM, 2014:14):

- The research for the future of the textile sector is going to continue, and the innovation infrastructure and cooperation is going to be strengthened. In this direction, improving the quality of life and solving environmental problems are targeted.
- In the symposium, the participant put emphasis on sustainability for reutilization of the products which are produced by modern production methods such as nano-technology, micro and nano-electronics, bio-technology.
- The natural resources are scarce so it is necessary to use sustainable raw materials.

The importance of sustainability increases due to environmental issues. Most of the businesses implement sustainability into their production processes and create new strategies. A general definition of global sustainability is effectively to "meet the needs of the present without compromising the ability of future generations to meet their needs." (WCED, 1987:8) According to Gilman (1992), sustainability means carrying on functions of a society, ecosystem or on-going system before its major resources are exhausted until an uncertain future. Like this, sustainable development "is a process of achieving human development...in an inclusive, connected, equitable, prudent, and secure manner." (Gladwin et.al. 1995) Therefore, sustainable enterprises provide economic, social and environmental benefits, so this contributes to sustainable development (Elkington, 1994).

The term sustainability is not a new word but a new definition referring to the relations between the responsibilities of the current generations for the environmental sensitiveness and future generations. The new definition of the term necessitates a change in the current mentality without decreasing life standards. The essence of this change lies on targeting environmental management, social responsibilities, and economic solutions within a universal solidarity(Ozmehmet, 2008:3).

Cleaner Production is an essential element of environmental management, because it provides us solutions to preserve raw material, water and energy. It also reduces the amount of all types of emissions and wastes being thrown to air, land and water. 'cleaner production' is a broad term defining the *comprehensive* preventive approach in order to protect environment. Its definition includes parts of Cleaner Production approach which are *cleaner technology*,

pollution prevention, waste minimization, non-waste technologies, waste reduction and source reduction (Alkaya et.al. 2011:2).

The major sources of environmental problems in textile sector occurs due to water energy and consumption, solvents, and dyes in production plants. We can divide the types of wastes which appear during these processes into three groups: solid, liquid and gas wastes. These groups are explained below (BUTEKOM, 2014:15):

- Solid wastes are divided into recyclable and non-recyclable. The recyclable ones are cottons, synthetic and fiber fabrics. On the other hand, non recyclable ones are emery, dyed rags and other laboratory materials.
- The liquid wastes are coloring materials which are generated during the production process, and emitted to the water.
- Gas wastes such as CO, SO₂, NO_X, aldehydes and dust occur due to LPG (Liquefied Petroleum Gas) and fuel-oil which are used in textile sectors.

The demand for environment-friendly products increases and this caused a new competitive environment for many industrial sectors. In this situation, firms realized that they can benefit from wastes including some raw materials which could be reutilized for new production through easy and efficient operations. These operations can result in waste reduction, pollution prevention, recycling, reutilization, environmental-friendly production design, because research in this direction has recently increased. Therefore, the term 'cleaner production' has become crucial for the business world (Yücel and Ekmekçiler 2008:325).

In this part of the study, the terms of sustainability and cleaner production are defined, and then interaction between them is evaluated. In the next part, general review of textile and clothing sectors in Turkey and in the world are reviewed. In this part, the studies of sustainability and cleaner production are also explained. Moreover, it is argued that we need to focus on how Turkey can get more benefit from implementing sustainability and cleaner production issues in these sectors. In the last part, the capabilities and performance in sustainable production of the companies which have located in Bingöl are analyzed. In addition, observations and evaluations in the previous parts are also summarized in this part. Then some recommendations are pointed out in order to improve sustainable and cleaner productions in textile and clothing sectors in Bingöl.

2. General Review of Textile and Clothing Sectors in Turkey

Textile, clothing and leather products (TCL) sector has played an important role in the economic development of countries. Textiles and clothing sectors contribute to the process of industrialization in developed countries during 18th century. These sectors also play a similar role in the economic development of the developing countries today (BSTB, 2015a:5).

The liberal economic reforms during 1980s in Turkey resulted in the integration of its national economy with the world economy. Since then Turkey has increased its competitiveness in different sectors to compete other national economies in the international arena (Ayhan et.al. 2016). In this direction, textile and clothing sector has also begun to grow rapidly in

Turkey, with the export-oriented development policy introduced in 1980 and increased investment in the sector since this date. Textile and clothing sectors are very vital in Turkey regarding Gross Domestic Product (GDP), share in manufacturing and industrial production, export, providing of net foreign currency inflow to the economy, employment and investment (Ekonomi Bakanlığı, 2016:1).

These sectors have total world exports of \$ 924.2 billion, and 5% share of world trade in 2013. In particular, labor-intensive production of clothing and leather products industry is shifting to countries where labor is cheaper. However, when the world trade is examined, the EU and the US are still pioneering countries in these sectors, and they remain as the largest exporters (BSTB, 2015a:5).

Table 1. The World Textile Export Ranking (In Billion U.S. Dollars)

	Countries	2011	2012	2013
1	China	97,3	97,78	108,96
	EU	84,38	79,02	80,9
2	India	19,63	19,78	24,49
3	USA	24,28	21,75	21,77
4	Germany	18,26	16,51	16,65
5	Italy	15,38	13,72	14,04
6	South Korea	14,07	13,65	13,8
7	TURKEY	11,44	11,65	12,75
8	Taiwan	11,88	11,04	10,97
9	Pakistan	9,56	9,22	9,74
10	Japan	9,41	9,14	8,21
	World Total	350,15	334,37	344,54

Source: International Trade Center, Trademap

As it is stated in the Table 1, Turkey is the one of the major players in the global textile export. Turkey is the 7th largest of the textile exporter, because it increased its textile export revenues from 11,44 billion Dollars in 2011 to 12,75 billion Dollars in 2013(BSTB, 2015b:19).

Table 2. The World Clothing Export Ranking (In Billion U.S. Dollars)

	Countries	2011	2012	2013
1	China	143,23	148,26	165,08
	EU	112,26	105,24	113,6
2	Bangladesh	22,12	22,43	26,1
3	Italy	21,4	20,31	21,63
4	Germany	19,89	18,46	18,32
5	Vietnamese	12,82	14,07	18,3
6	India	13,74	12,89	15,7
7	TURKEY	13,51	13,86	14,97
8	Spain	8,85	9,27	11,06
9	France	10,11	9,43	10,07
10	Netherlands	8,87	7,97	8,95

Source: International Trade Center, Trademap

Table 2 shows that, Turkey is the one of the major players in the global clothing export as textile sector. Turkey is the 7th largest of the clothing exporter, and Turkey increased its clothing export revenues from 13,51 billion dollars in 2011 to 14,97 billion Dollars in 2013.

Table 3. TCL Sector Key Indicators in Turkey

Year 2014	Production Value (Billion Dollar)	Export (Billion Dollar)	Number of Employees	Number of Firms
Textile	30,6	13,1	441.972	17.520
Clothing	21,9	16,4	495.868	34.963
Leather Products	2,9	1,3	64.715	6.763
Total	55,4	30,7	1.002.555	59.246

Source: BSTB, TÜİK.

Table 3 shows that TCL sectors have been the most important sectors with regarding, 55,4 billion Dollars in total revenue, 30,7 billion Dollars in export and providing employment to 1 million people (registered). The point that these sectors reached due to their quality, fashion, innovation and design can't be underestimated. This state of the industries carry Turkey to the forefront in the global market (BSTB, 2015b:17).

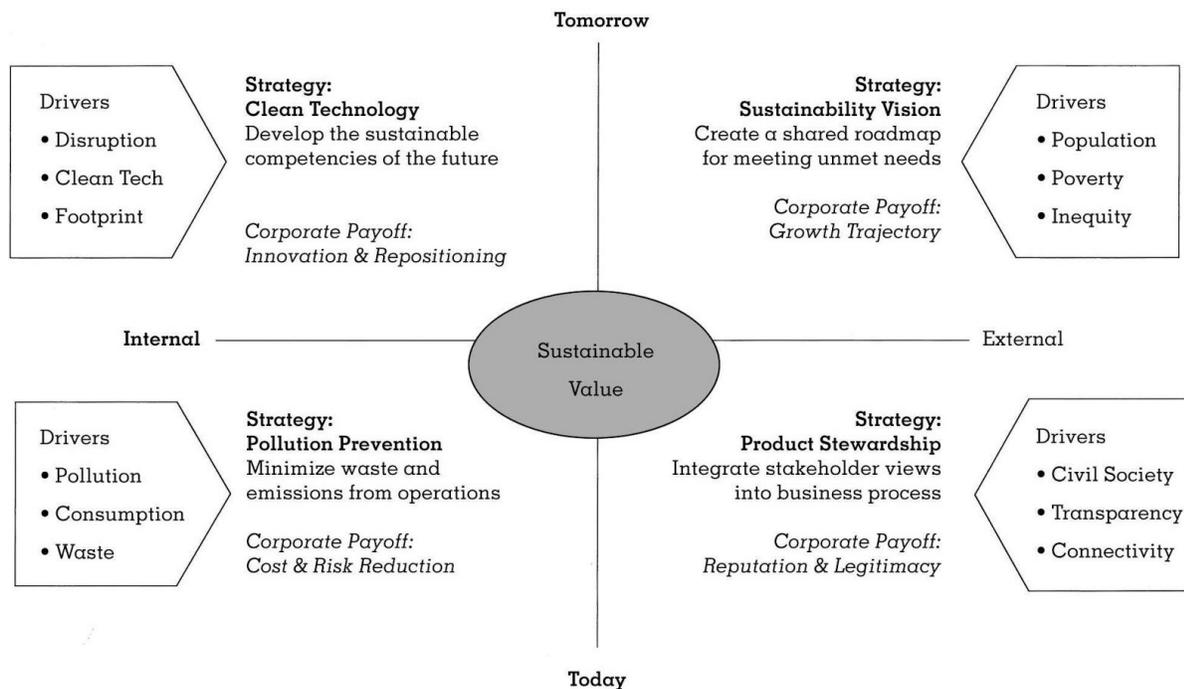
The share in GDP providing employment and high export potential indicate that the TCL are the leading sectors of the national economy. More than 10 % of the country's GDP and 17 % of the value added are provided by these sectors in Turkey (BSTB, 2015a:8).

Clothing sector is an important value-added sector, because it is the labor-intensive sector. Manufactured products in this sector are being processed for the fashion industry in the textile sector. However, considering that clothing sector requires intensive labor, the investments focus on developing countries where labor is cheaper (BSTB, 2015b:18).

3. Sustainability and Cleaner Production in Turkish Textile and Clothing Sectors

When considering the share of textile sector in Turkey's industry (One-third of industrial employment and 16,3 % of industrial production), it is clear that the studies will directly contribute to the sustainable development of the country. However, wrong implementation of new technologies in the textile and clothing sectors, for instance, create environmental problems (BUTEKOM, 2014:12).

Table 4. The Sustainable Value Framework



Source: Stuart L. Hart and Mark B. Milstein (2003)

Stuart L. Hart and Mark Milstein developed this model which identifies strategic production and business practices to create a more sustainable value framework. This model defines sustainable value through four dimensions: pollution prevention, product stewardships clean technology and base of pyramid. These dimensions have various links with performance of the firms and creating value (Stuart L. Hart, 2015):

- **Pollution Prevention:** Decreasing waste and emissions that occur as a result of current facilities and operations;

- **Product Stewardship:** Attract the attention of shareholders and running the life cycle of today's products;
- **Clean Technology:** Developing and deploying the clean technologies of the future known as "next-generation"
- **Base of the Pyramid:** Creating together the new businesses in order to serve the needs are not met and underserved.

The according to the model, the managers in the firms should firstly consider the creation of sustainable value.

Growing Profits and Reducing Risk Through Pollution Prevention; Firms can develop their skills and capabilities by preventing the pollution of industrial and eco-efficiency. With this way, they will have some advantages in decreasing costs and risks. For improving the environmental efficiency of current products and processes; firms have to focus on pollution prevention. The term of pollution prevention means reducing the waste and emissions occurred within the operations. Minimum waste refers to better operating inputs, resulting in minimum costs for waste disposal and raw materials. If firms develop skills and capabilities concerning prevention of industrial pollution, and achieve eco-efficiency, they will have opportunity to decrease costs and risks. Firms need to focus on pollution prevention because this can improve the environmental efficiency of today's products and processes. The pollution prevention refers to the reduction of waste and emissions within the current operations. Less waste means better utilization of inputs, resulting in lower costs for raw materials and waste disposal (Hart and Milstein, 2003:60).

In this context, sustainable development policies and preventions needed to be continued and is applied with precision for a long time in our country. Recently; energy, economic and environmental issues are evaluated together due to frequency of the negative consequences of climate change. In this direction, the Turkish major policies and preventions focus on sectoral areas such as textiles, energy, industry, transport, agriculture, waste, forestry (BUTEKOM, 2014:13).

In Turkey, "Integrated Pollution Prevention and Control Communication in the Textile Sector" is a recent study done for the textile industry, and published by Turkish Environment and Urban Ministry in 2011. The main issues discussed in this study are; using the technologies for minimizing the negative effects on environment regarding the production, raw materials, increasing energy efficiency and clean production (BUTEKOM, 2014:32). Consumers prefer the products of textile and clothing with certain quality and eco-textile brands (Batıgün, 1997:118).

On the other hand, one of the major achievements obtained by the firms is the implementing strategies of green marketing within international businesses (Ar and Tokol, 2010:150):

- Increasing the market value of company stock is sensitive about environment,
- Providing measurable economic benefits to business,
- Implementing strategic planning into environmental issues in order to create positive impact on financial performance,

- Taking environmental responsibility to provide positive effect on the business image.

All these reasons, industrialists have begun to consider more about environmental aspects. The industrialists try to find out solutions for these issues; using raw materials to a minimum level, reduction of energy usage in the production processes, search for clean energy sources, leaving harmful packaging materials, and destructing them easily. These results are reflected in all industries into fairly large waves (Ar and Tokol, 2010:151).

The production is focused on people and the environment. For this reason the question of 'How can I protect the environment while gaining profits?' should be the very essential (Ar and Tokol, 2010:151).

4. The Case of Textile and Clothing Sectors in Bingöl

Examining the clothing industry in Bingöl can provide a better understanding of sustainability issues in Turkish textile and clothing sector. The capabilities of the businesses, which are located in Bingöl, in the implementation of sustainability into their production processes, and creating new strategies are analyzed. So some questions related to sustainability were asked to the managers of two selected companies. The Company A refers to Değişim Incorporation, the Company B refers to Binler Incorporation.

The following conclusions were reached on the capabilities of sustainable production.

The company A was founded in 2005 in Bingöl. Firat Development Agency (FDA) encouraged the company within the project for expenditure costs in the process of establishment. FDA operates under the Ministry of Development in Turkey. The company has 210 employees. It produces its product after taking orders from the company's Istanbul Office. The company's products are only shirts.

The company B was founded in 1995 in Bingöl. FDA also encouraged this company within the project for expenditure costs in the process of establishment. The company has 200 employees. It also produces its product after taking orders from the company's Istanbul Office.

Production and Raw Materials; The Company A produces only shirts; company B produces trousers, track suit, shorts, military camouflage. Both companies take care of their customers' requests about kinds of raw materials in the production. Beside this, Company A generally prefers cotton and polyester fabrics, while Company B additionally prefers waterproof fabrics for the raw materials.

Company B is successful in the care of environmental issues regarding the fabric types. But none of them use the nano-technological and in-organic fabrics for production. There is no washing in production process in Company A. But Company B outsources the process of washing for the products which are needed to be washed.

ISO Quality Certification; Only Company B has this certification, on the other hand Company A applied to get the same certificate a few months ago, and it now tries to meet the certification's requirements.

Minimizing the Costs;**Table 5.** Information Courses Supported by ISKUR

Type of Courses Given By ISKUR*	COMPANY A (Number of Employee)	COMPANY B (Number of Employee)
Vocational courses	45	40
Job courses	30	20

* The Institution of Providing Jobs and Employees

According to **Table 5**, both companies have some policies about minimizing the costs. One of their policies is to pay salaries of the some employees for job courses and vocational courses that are given by The Institution of Providing Jobs and Employees (ISKUR). ISKUR encourages companies for minimizing costs and training the employees by these courses.

The first type of courses is Job Course which takes 5 months. ISKUR pays 1100 TRY (\$ 367) monthly salary for each employee which takes this course. Second type of courses is vocational courses that are given after first courses, and these courses take 8 months. Iskur pays 660 TRY (\$ 220) monthly salary for these courses. While Company A has 75 employees, Company B has 60 employees who joined these courses. When these advantages are analyzed, Company A seems to be more successful in minimizing the costs compared to Company B.

Table 6. Electricity Consumption of Companies (Monthly)

	COMPANY A	COMPANY B
Electricity Consumption (Monthly*)	7000 TRY	5500 TRY

*Two companies have same capacity of production (Approximately 30 000 units)

The other policy is benefiting from the discounts for electricity bills provided to industrial enterprises by state. The discount rate can reach from 10 percent to % 15 percent for electricity bills. The Company A's monthly average electricity bill is 7000 TRY (\$ 2334) while it is 5500 TRY (\$ 1834) for Company B. These companies benefit from the %15 discount for electricity bills. Moreover, they both take some measures to decrease the electricity bills. For example, the Company B decreases the electricity bills by using energy-saving bulbs in company.

Monthly Consumption of Oil and Coal;**Table 7.** Monthly Consumption of Oil and Coal

	COMPANY A	COMPANY B
Oil Consumption Per Unit*	0.00012 Liter	0.00016 Liter
Yarn Consumption Per Unit*	Shirt: 140 Meter	Trousers: 250 Meter Track suit: 500 Meter Shorts: 150 Meter Military Camouflage: 750 Meter
Coal Consumption Per Unit*	0.33 Kg	0,41 Kg

*Two companies have same capacity of monthly production (Approximately 30 000 units)

While Company A's monthly consumption of oil is 0.00012 Liter per unit of products, Company B's consumption is 0.00016 Liter per unit. About yarn consumption per unit, Company A use less yarns compared to Company B. The Company A's monthly coal consumption for production and heating is 0.33 Kg per unit of products. This amount is 0,41 Kg for Company B.

According to these results, Company A pollutes the environment less than Company B. Both companies are planning to use natural gas for production and heating. The natural gas pipe line is going to be available for usage in Bingöl until the end of the year 2016. When the natural gas is once available, the pollution caused by using coal is going to be ended. Currently, Company A burns the wastes which occur during production process. However, Company B throws wastes into the trash.

5. Conclusion and Recommendations

Considering the expected increase in textile production in the world, the issues of sustainable and cleaner production technologies gain importance. Therefore, it became necessary for the firms to implement sustainability and cleaner production terms into production processes within the textile and clothing sectors. In this direction, textile and clothing sectors in Turkey are evaluated in this study. In order to make deep analysis, the case of two companies (A and B) in the clothing sector in Bingöl was taken as the case study.

As a result of the case study analysis, the following conclusions and recommendations are given below:

Both companies (A and B) are encouraged by Firat Development Agency (FDA) within the project for expenditure costs in the process of establishment. However, it is not only enough to establish a company, but also it is necessary to encourage them in projects including sustainability and cleaner production. In this direction, these companies are expected to

implement new project to achieve better sustainability and cleaner production. These projects are mainly supported and financed by FDA and KOSGEB (Small and Medium Industry Development Organization).

Both companies take care of their customers' requests regarding different kinds of raw materials in the production. In addition, Company A generally prefers cotton and polyester fabrics, while Company B additionally prefers waterproof fabrics for the raw materials. Company B is successful in the care of environmental issues regarding the fabric types. But none of these companies use the nano-technological and in-organic fabrics for production. There is no washing in production process in Company A. In contrast, Company B outsources the process of washing for the products which are needed to be washed. These companies should use more environment friendly products which can be reutilized in other productions. For instance, they can produce eco-labeled products in order to get advantages in competitive environment.

Comparing these companies according to having ISO Quality Certification, we see that only Company B has it. Therefore, it is crucial for Company A to get the same certificate in the near future, so it can increase its competitiveness against other companies in the sector.

Both companies have some policies about minimizing the costs. One of their policies is to pay salaries of some employees for job courses and vocational courses that are given by The Institution of Providing Jobs and Employees (ISKUR). This institution encourages companies for minimizing costs and training the employees by these courses. The second policy to minimize cost is getting state subsidies for the firms. It is seen that both companies benefit from the %15 discount provided by State for electricity bills. In order to establish financial sustainability, both companies need to benefit from all state subsidies at maximum level.

According to the result of oil, yarn and coal consumption, Company A pollutes the environment less than Company B, because the first company uses production materials per unit more efficiently than the second company. In order to reduce pollution, both companies should switch from coal consumption to natural gas consumption which is going to be available for the firms in Bingöl until the end of the year 2016.

Considering the recycling issue, both companies have no waste policy at all. Company A burns the wastes which occur during production process, while Company B throws wastes into the trash. Therefore, both companies fail to establish an effective waste policy for sustainability and cleaner production. For this reason it will be better if they send their waste to recycling in order to establish cleaner environment. It is necessary to increase public awareness by informing them about the advantages of environmental friendly products. On the other hand, companies are also need to be encouraged to produce better quality and environmental friendly products.

In summary, it is necessary to be aware how essential sustainable and cleaner production for the current and future generations. Society, firms and states have to be responsible for this issue because there is a need for cooperation between them. Especially, the state should increase public awareness while encouraging the firms to achieve sustainability and cleaner production in their production processes.

References

- Alkaya, E. M. Böğürücü, F. Ulutaş, G.N. Demirer (2011), *Cleaner (Sustainable) Production In Textile Wet Processing*, Nova Science Publishers Inc New York, USA.
- Aybeniz Akdeniz Ar and Tuncer Tokol (2010), Tekstil Sektöründeki İşletmelerin Yeşil Pazarlamadan Kaynaklı Kazanımları (Benefits Of Companies in Textile Sector Arising from Green Marketing), 9(31), pp.148-168.
- Ayhan, Emrah; Tan, Muhsin; Baydaş, Mahmut (2016), "Neo-Liberal Globalization and Turkey", *The Journal of MacroTrends in Social Science*, 2 (1), pp. 62-76.
- Batıgün, C. M. (1997), *Çevre Sanayicimiz ve Dış Ticaret (Our Environmentalist Industry and Foreign Trade)*, İstanbul, Türkiye: İstanbul Sanayi Odası Çevre Şubesi.
- BSTB-Bilim, Sanayi ve Teknoloji Bakanlığı (2015a), "Tekstil, Hazırgiyim ve Deri Ürünleri Sektörleri Raporu 2015/1"
- BSTB-Bilim, Sanayi ve Teknoloji Bakanlığı (2015b), "Türkiye Tekstil, Hazırgiyim ve Deri Ürünleri Sektörleri Strateji Belgesi ve Eylem Planı 2015-2018"
- BUTEKOM-Bursa Tekstil & Konfeksiyon Ar-Ge Merkezi (2014), "Teknolojik Değerlendirme Raporu Tekstil Terbiye Sektöründe Temiz Üretim İçin Örnek Modellerin Oluşturulması Projesi: Tekstilde Çevre"
- Ekonomi Bakanlığı (2016), "Sektör Raporları: Hazır Giyim Sektörü", Sitc No: 84, Armonize No: 61 and 62.
- Gilman, R. (1992), *Sustainability By Robert Gilman from the 1992 UIA/AIA Call for Sustainable Community Solutions*. Accessed on 16.07.2016, <http://www.context.org>.
- Gladwin, T., Kennelly, J., & Krause, T. (1995), Shifting Paradigms For Sustainable Development: Implications For Management Theory And Research. *Academy of Management Review*, 20(4), pp. 874–907.
- Ozmehmet Ecehan (2008), "Dünyada ve Türkiye Sürdürülebilir Kalkınma Yaklaşımları", *Journal of Yaşar University*, 12(3), pp.1853-1876
- See Elkington, J. (1994), "Towards the sustainable corporation: Win-win-win Business Strategies For Sustainable Development", *California Management Review*, 36(3), pp. 90–100.
- Stuart L. Hart (2015), *Sustainable Value*, (Access on 02.05.2016: <http://www.stuartlhart.com/sustainablevalue.html>)
- Stuart L. Hart and Mark B. Milstein (2003), "Creating Sustainable Value", *Academy of Management Executive*, 17(2).
- Uluslararası Ticaret Merkezi, Ticaret Haritası Veri Tabanı (International Trade Center, Trademap), Accessed on 16.07.2016, <http://www.trademap.org>
- WCED -World Commission on Environment and Development (1987), *Our Common Future*. Oxford: Oxford University Press.
- Yücel Mustafa and Ümit Serkan Ekmekçiler (2008), "Çevre Dostu Ürün Kavramına Bütünsel Yaklaşım; Temiz Üretim Sistemi, Eko-Etiket, Yeşil Pazarlama", *Electronic Journal of Social Science*, 7(26) pp. 320-333.