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The Study of Drivers of Sustainable Manufacturing Practices in Fast Moving Consumer Goods Egyptian Sector and Their Impact on Competitive Capabilities

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Abstract

Globally, Sustainable manufacturing techniques and the circular economy are becoming increasingly important as people become more aware of the positive impact they may have on the environment and the economy.

The study pinpointed the drivers of sustainable manufacturing practices in the Fast- Moving Consumer Goods (FMCG) Industry in the Egyptian sectors as well as the different strategies needed to be incorporated to reach the sustainable manufacturing, also the impacts of sustainable manufacturing practices on the competitive advantage of FMCG Egyptian sectors and lastly the main challenges facing the FMCG which hinder the full implementation of sustainable manufacturing practices.

The result of the study shows that FMCG companies in Egypt are often motivated to incorporate sustainable manufacturing practices for different reasons, but mainly in order to become a part of the global direction which encourages and aiming for a more sustainable life. Becoming an environmentally responsible organization has turned to be a main goal and even a required condition for the foreign investment who is searching for the most efficient sustainable investment.

This research also provides some recommendations in order to take a step towards reaching the sustainable development through the sustainable manufacturing.

This research will involve the use of quantitative data collection method; this will include the use of questionnaire as a primary method of data collection. Secondary data for the research will be gathered from a variety of sources such as academic journals, textbooks, magazines, reports...etc.

Keywords:

Sustainable Manufacturing, FMCG Egyptian Sector, Sustainable Practices, drivers, impacts, challenges, Competitive.

دراسة العوامل المحركة لممارسات التصنيع المستدامة في قطاع السلع الاستهلاكية المصري سريع الحركة وأثرها على القدرات التنافسية

الملخص

أصبحت تقنيات التصنيع المستدامة والاقتصاد الدائري ذات أهمية متزايدة على الصعيد العالمي، حيث أصبح الناس أكثر وعياً بالتأثير الإيجابي الذي قد يحدثونه على البيئة والاقتصاد.

حددت الدراسة دوافع ممارسات التصنيع المستدامة في صناعة السلع الاستهلاكية سريعة الحركة في القطاعات المصرية، بالإضافة إلى الاستراتيجيات المختلفة المطلوب دمجها للوصول إلى التصنيع المستدام، وكذلك آثار ممارسات التصنيع المستدام على القدرة التنافسية للسلع الاستهلاكية المصرية سريعة الحركة، وأخيراً التحديات الرئيسية التي تواجه السلع الاستهلاكية سريعة الحركة والتي تعيق التنفيذ الكامل لممارسات التصنيع المستدامة.

أظهرت نتيجة الدراسة أن شركات السلع الاستهلاكية سريعة الحركة في مصر غالباً ما تكون مستعدة لدمج ممارسات التصنيع المستدامة لأسباب مختلفة، ولكن بشكل أساسي لكي تصبح جزءاً من الاتجاه العالمي الذي يشجع ويهدف إلى حياة أكثر استدامة. لقد أصبح التحول إلى منظمة مسؤولة بيئياً هدفاً رئيسياً بل وشرطاً مطلوباً للاستثمار الأجنبي الذي يبحث عن الاستثمار المستدام الأكثر كفاءة.

كما يقدم هذا البحث بعض التوصيات من أجل اتخاذ خطوة نحو تحقيق التنمية المستدامة من خلال التصنيع المستدام.

سيضمن هذا البحث استخدام طريقة جمع البيانات الكمية؛ وسيشمل ذلك استخدام الاستبيان كوسيلة أساسية لجمع البيانات. سيتم جمع البيانات الثانوية للبحث من مجموعة متنوعة من المصادر مثل المجلات الأكاديمية والكتب المدرسية والمجلات والتقارير وغيرها.

Section 1. Introduction:

According to the Brundtland Commission, formerly the World Commission on Environment and Development¹, sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”²

As for Egypt, the national efforts to achieve sustainable development are progressing as the Egyptian ministries have put sustainability as one of the priorities in order to achieve Egypt’s vision 2030, “Leading the country’s efforts towards sustainable development & economic prosperity for a better life”³.

Multiple factors such as the need to reduce negative effects on the environment, increase production efficiency and productivity, and better serve the interests of workers and customers are propelling the rise of sustainable manufacturing techniques.

The sustainable manufacturing is considered as one of the goals of the sustainable development. Although manufacturing constitutes a threat for the sustainability, it is also considered as a solution.⁴

The manufacturing sector is important for sustainable development of the global society since it helps addressing global challenges such as needs for renewable energy sources, green buildings, reduce production waste, ...etc.⁵

One of the most relevant definitions of sustainable manufacturing is “the production of manufactured goods using

¹ A sub organization of the United Nations (UN) aiming to unite the countries in order to pursuit the sustainable development.

² https://en.wikipedia.org/wiki/Brundtland_Commission#:~:text=The%20Brundtland%20Commission%2C%20formerly%20the,in%20pursuit%20of%20sustainable%20development; last edited on 6 July 2023, at 09:02.

³ <https://mped.gov.eg/MinistryVision?lang=en>; site of Ministry of Planning and Economic Development.

⁴ Z. Molamohamadi, N. Ismail, Developing a new scheme for sustainable manufacturing Int. J. Mater. Mech. Manuf., 1 (2013), pp. 1-5.

⁵ <https://www.sciencedirect.com/science/article/pii/S0959652617317213#bib41>; Journal of Cleaner Production, Volume 166, 10 November 2017, Pages 744-755.

economically viable procedures that limit negative environmental consequences and impacts while preserving natural and energy resources”⁶.

The Research Problem:

➤ What are the drivers of sustainable manufacturing practices in the FMCG Egyptian Sector?

In order to answer this question, the following queries should be treated:

- What are the different motivations of the organizations to incorporate sustainable manufacturing practices?
- what are the different sustainability strategies needed to be incorporated to ensure sustainable manufacturing practices in FMCG Egyptian sectors?
- what are the impacts of sustainable manufacturing practices on the competitive advantage of FMCG Egyptian sectors?
- what are the Challenges facing the FMCG Egyptian sectors in implementing sustainable manufacturing practices, i.e., the challenges that hinder the full implementation of sustainable manufacturing practices?

Egypt has faced new internal and regional circumstances; a well-structured strategy was developed in order to cope with these challenges. Through Egypt’s Vision 2030, Egypt has made a long-term plan aiming to reach a sustainable development in all fields. One of the main sectors is the manufacturing. The FMCG Industry in the Egyptian sectors is considered one of the largest important industries as it is related to the economy of the country as well as the consumers which might be national citizens or foreigners dealing with the goods

⁶<https://www.researchgate.net/publication/313361775> The impact of sustainable manufacturing practices on sustainability performance Empirical evidence from Malaysia; The impact of sustainable manufacturing practices on sustainability performance: Empirical evidence from Malaysia, February 2017 International Journal of Operations & Production Management 37(2):182-204, DOI:10.1108/IJOPM-04-2015-0223.

Abdul-Rashid, S. H., Sakundarini, N., Ariffin, R. and Ramayah, T. (2017). Drivers for the adoption of sustainable manufacturing practices: A Malaysia perspective. International Journal of Precision Engineering and Manufacturing, 18 (11), 1619–1631.

produced in Egypt and exported internationally. The identification of the drivers of sustainable manufacturing practices in the FMCG Egyptian Sector is a must in order to understand the current situation and the requirement needed to reach the future goals. Therefore, the research will be focusing on collecting information from the employees working in this field

Research Objectives:

The goal of this research is to identify the drivers of sustainable manufacturing practices in FMCG Egyptian sectors, this will be done by specifying the different reasons for incorporating sustainable manufacturing practices, also determining the strategies needed to be incorporated by the organizations, evaluating the impacts on the competitive advantage of the FMCG Egyptian sector and lastly by examining the main challenges facing the FMCG Egyptian sectors in implementing sustainable manufacturing practices.

Research Methodology:

This research will involve the use of quantitative research strategy to gather data from the selected staff of FMCG companies in Egypt.

For the purpose of this study, the mono method will be used; only quantitative method will be used to collect and analyze data. From the quantitative method, only questionnaire will be employed for the study and the data gotten from the questionnaire will be analyzed quantitatively.

Sample & Sampling Technique:

In order to gather the data required, the researcher will select a total of 150 employees working in the FMCG companies in Egypt, using the formula below:

$$\frac{\text{No. of employees}}{\text{No. of FMCG companies}} = \frac{35,400}{236} = 150$$

This section presents the results obtained from the questionnaire administered to the selected 150 staff of the selected FMCG companies in Egypt. A total of 150 copies of questionnaire were administered and retrieved. The questionnaire is structured in seven main sections viz:

Section 1 presents the introduction; Section 2 presents the analysis of the demographic characteristics of the respondents using frequency and percentage tables; the following sections presents the analysis of data and discussion on the drivers of sustainable manufacturing practices in FMCG Egyptian sectors using Arithmetic Mean and Standard Deviation Analysis; Section 3 presents the discussion on the sustainability strategies needed to be incorporated to ensure sustainable manufacturing practices in FMCG Egyptian sectors using Arithmetic Mean and Standard Deviation Analysis; Section 4 presents the discussion on the impacts of sustainable manufacturing practices on the competitive advantage of FMCG Egyptian sectors using Arithmetic Mean and Standard Deviation Analysis; Section 5 presents the discussion on the challenges facing the FMCG Egyptian sectors in implementing sustainable manufacturing practices using Arithmetic Mean and Standard Deviation Analysis and Section 6 presents the summary of findings. For the purpose of the research, we will start elaborating section 2.

Section 2. Demographic Characteristics of Respondents

Table 2.1: Gender of the Respondents

Responses	Frequency	Percentage %
Male	99	66.0
Female	48	32.0
Prefer not to say	3	1.0
Total	150	100

Source: Field work, 2022

Table 2.2: Age of the Respondents

Responses	Frequency	Percentage %
18-25 years	39	26.0
26-35 years	51	34.0
36 and above	60	40.0
Total	150	100

Source: Field work, 2022

Table 2.3: Educational Level of the Respondents

Responses	Frequency	Percentage %
Secondary School Certificate	6	4.0
Diploma	15	10.0
Bachelors	105	70.0
Masters	21	14.0
Ph.D.	3	2.0
Total	150	100

Source: Field work, 2022

Table 2.4: Length of service in the organization

Responses	Frequency	Percentage %
0-5 years	108	72.0
6-10 years	30	20.0
11 years and above	12	8.0
Total	150	100

Source: Field work, 2022

It is important to mention that the arithmetic mean of axis equals 37.5 and significance probability (Sig.) equals 0.000. the response with the least standard deviation is considered as the most effective and acceptable response.

Section 3: the first question raised is: why the organization is motivated to incorporate sustainable manufacturing practices?

S/N	Different reasons	TOTAL	MEAN	STANDARD DEVIATION	SIG. VALUE	RANK OF STANDARD DEVIATION
1	The need to reduce operating cost	150	37.5	35.9615	*0.000	2
2	Reputation maintenance or improvement	150	37.5	41.5685	*0.000	5
3	Stakeholders' pressure	150	37.5	43.9642	*0.000	6
4	Government regulations/legislative pressure	150	37.5	36.7615	*0.000	3
5	Top management commitment	150	37.5	44.3875	*0.000	7
6	The need to be a socially responsible organization	150	37.5	37.4455	*0.000	4
7	The need to be an environmentally responsible organization	150	37.5	35.8373	*0.000	1 (Most Efficient Response)

Note: *Arithmetic mean is statistically significant at a level of significance. $\alpha = 0.05$

Accordingly, the statement which received the highest degree of approval is the seventh statement “My organization is motivated to incorporate sustainable manufacturing practices because of the need to be an environmentally responsible organization”, it is the most efficient response, according to the least standard deviation.

This indicates that from the responses gotten from the respondents, a good number of FMCG companies in Egypt are often motivated to incorporate sustainable manufacturing practices because of the need to be an environmentally responsible organization.

FMCG companies in Egypt, aiming to improve environmental conditions, have adopted the practice of environmentally responsible investing, as producing "green" products to replace traditional ones, which have various damages to the environment such as land pollution, air pollution, depletion of environmental resources among others.

This corroborates with Missimer, Robèrt and Broman (2017) who argued that most manufacturing companies are often compelled to have the goal to find a way to make a positive impact on the environment while making a profit in the form of a social enterprise. The goal of this sort of investment is to attract backers who are keen on supporting environmental causes with the primary objective of enhancing societal benefits while minimizing negative effects on the environment and increasing financial returns⁷.

From the arithmetic mean analysis presented in table 3, it can be statistically claimed that the first reason stating: “because of the need

⁷ A Strategic Approach to Social Sustainability - Part 1: Exploring the Social System, by Merlina Missimer, Karl-Henrik Robèrt and Göran Broman, April 2016, Journal of Cleaner Production 140

DOI:10.1016/j.jclepro.2016.03.170.

https://www.researchgate.net/publication/301303463_A_Strategic_Approach_to_Social_Sustainability_-_Part_1_Exploring_the_Social_System.

Missimer, M., Robèrt K. H. & Broman, G. (2017). A strategic approach to social sustainability – Part 2: a principle-based definition, Journal of Cleaner Production, [e-journal] vol. 140, part 1, pp. 42-52, Available through: LUSEM Library website <https://www.lusem.lu.se/library>; LUND University, School of Economics and Management.

to reduce operating cost”, i.e., the cost of running their businesses or daily activities., has the second most efficient response.

The efficient use of natural resources is considered a necessary condition for their sustainable use. Extending the lifetime of products and using resources circularly are two popular strategies to increase the efficiency of resource use. Both strategies are usually assumed to contribute to the eco-efficiency of resource use independently⁸.

From the arithmetic mean analysis presented in table 3, it can be statistically argued that the fourth reason stating that “because of government regulations/legislative pressure” has the third most efficient response.

The government of Egypt is committed to ensure that all business organizations incorporate environmental sustainability in their practices; this is simply because they fully understand its effects on the environment, hence, creating several regulations and mounting several pressures on business organizations to ensure the incorporation of sustainability strategies in the daily activities, which will help to speed up the spread of clean energy, boost health outcomes, and slow the rate of global warming.⁹

The means for the government to push firms to do this is by the implementation of new laws. The upper-level management of any organization is under pressure to ensure that government regulations are followed, and most managers follow such regulations even if it is only to protect them from potential legal action.

From the arithmetic mean analysis presented in table 3, it can be statistically claimed that reason No. 6 which states “because of the need to be a socially responsible organization” has the fourth most efficient response.

Many of the FMCG companies in Egypt have adopted socially responsible investments as a long-term tactic for gaining a market edge. When a non-profit organization can guarantee a social and economic benefit, even if investors do not make money, they may

⁸ <https://www.sciencedirect.com/science/article/pii/S0959652622027949>; Journal of Cleaner Production, Volume 368, 25 September 2022, 133207.

⁹ <https://sustainabledevelopment.un.org/memberstates/egypt>; site of United Nations, Sustainable Development Goals, Knowledge Platform.

count on continuous investment. In this context, "socially responsible investment" (SRI) refers to the practice of considering the interests of all parties involved in a business decision, rather than just the interests of the company itself.¹⁰

From the arithmetic mean analysis presented in table 3, it can be statistically claimed that reasons No. 2, 3 and 5 which state: "because of reputation maintenance or improvement, because of stakeholders' pressure and because of top management commitment" has the fifth, sixth and seventh least efficient responses respectively.

Section 4: The second question: what are the sustainability strategies needed to be incorporated to ensure sustainable manufacturing practices in FMCG Egyptian sectors?

In other words, what does the organization need to incorporate in order to ensure sustainable manufacturing practices?

There are different tools which guides the organization toward sustainable practices and indicates how the latter contributes to a global sustainable development.

S/ N	Sustainability strategies which need to be incorporated	TOTAL	MEAN	STANDARD DEVIATION	SIG. VALUE	RANK OF STANDARD DEVIATION
1	My organization still need to incorporate waste minimization strategy	150	37.5	35.6784	*0.000	1(Most Efficient Response)
2	My organization still need to incorporate natural resource efficiency strategy	150	37.5	36.9881	*0.000	3
3	My organization still need to incorporate eco-efficiency strategy	150	37.5	37.9823	*0.000	4
4	My organization still need to incorporate energy efficiency strategy	150	37.5	36.9055	*0.000	2
5	My organization still need to incorporate material efficiency strategy	150	37.5	42.6894	*0.000	5

Note: *Arithmetic mean is statistically significant at a level of significance. $\alpha = 0.05$

¹⁰ <https://link.springer.com/article/10.1023/B:BUSI.0000033106.43260.99>; The Maturing of Socially Responsible Investment: A Review of the Developing Link with Corporate Social Responsibility, written by Russell Sparkes & Christopher J. Cowton, Published on June 2004.

Accordingly, the statement which received the highest degree of approval is the first statement “My organization still need to incorporate waste minimization strategy to ensure sustainable manufacturing practices”, it has the first most efficient response.

Activities aimed at reducing waste from the sources in FMCG companies are included under the umbrella term of "waste minimization", these include but not limited to avoidance of product loss; wastewater recycling and treatment of sewage; wastepaper recycling and repackaging; factory and office disposables recycling and repackaging; renewable energy consumption¹¹.

This corroborates with Li, Zhou and Liu (2020) who argued and proposed that waste minimization encompasses four distinct strategies such as: reducing the amount of raw materials used in production so that there is less waste when the product is thrown away; increasing the longevity of products; avoiding the generation of waste through active measures; and substituting less harmful substances¹².

From the arithmetic mean analysis presented in table 4, it can be statistically claimed that item 4 which states that “My organization still need to incorporate energy efficiency strategy to ensure sustainable manufacturing practices” has the second most efficient response.

It could be noted that many FMCG companies in Egypt are still making use of non-renewable sources of energy such as petroleum for power supply while some are making use of renewable sources of energy such as solar, wind and water as sources of energy.

¹¹https://www.researchgate.net/profile/Shadi-Kafi-Mallak/publication/277184609_Waste_Minimisation_as_Sustainable_Waste_Management_Strategy_for_Malaysian_Industries/links/5564466608ae6f4dcc98e869/Waste-Minimisation-as-Sustainable-Waste-Management-Strategy-for-Malaysian-Industries.pdf; Waste Minimisation as Sustainable Waste Management Strategy for Malaysian Industries, August 2012, written by: Shadi Kafi Mallak, Md Bakri Ishak, Ishak Fakulti, Alam Sekitar.

¹² Li, K., Zhou, T. & Liu, B. H. (2020). Internet-based intelligent and sustainable manufacturing: developments and challenges, *International Journal of Advanced Manufacturing Technology*, vol. 108, issue 5/6, pp. 1767-1791, doi: 10.1007/s00170-020-05445-0.

This corroborates with Hami, Muhamad & Ebrahim (2015) who argued that Energy Efficiency is fundamental to all eco-friendly plans, it is easier to put into effect because of the apparent clarity of its performance metric (material out minus material in)¹³.

From the arithmetic mean analysis presented in table 4, it can be statistically claimed and argued that item 2 which states that “My organization still need to incorporate natural resource efficiency strategy to ensure sustainable manufacturing practices” has the third most efficient response.

Reducing waste and using fewer resources are all part of the natural resource efficiency strategy. All materials introduced into an economy eventually become emissions and wastes; therefore, decreasing emissions and decreasing the use of natural resources are both necessary to lower environmental damage costs.

This is in alignment with the assertion of Garbyal & Mittal (2019) who argued that reducing wasteful use of natural resources, embracing technological change that boosts the efficiency of a given amount of natural resources, replacing other inputs like labor for natural resources so that output remains the same while natural resource use has been reduced, recycling materials so that the same unit of natural resources is used multiple times, and substituting one natural resource for another are all strategies that several manufacturing companies are craving to incorporate in order to increase sustainable manufacturing practices¹⁴.

¹³ The Impact of Sustainable Manufacturing Practices and Innovation Performance on Economic Sustainability, *Procedia CIRP*, Volume 26, 2015, Pages 190-195, available through: <https://www.sciencedirect.com/science/article/pii/S2212827114012189>.

Hami, N., Muhamad, M. R. & Ebrahim, Z. (2015). The impact of sustainable manufacturing practices and innovation performance on economic sustainability, *Procedia CIRP*, vol. 26, pp.190-195, doi: 10.1016/j.procir.2014.07.167.

¹⁴ Environmental Issues and Sustainable Agriculture, Chapter-4 Climate Change and Global Warming: Policies, Planning and Management, published on May 2019, written by: Indu Bala Sethi, Mahesh Jajoriya, Suresh Kumar, Niranjana Barod, available through:

https://www.researchgate.net/profile/LaxmanBalai/publication/351513514_Environmental_Issues_and_Sustainable_Agriculture_Environmental_Issues_and_Sustainable_Agriculture/links/609b7354458515d3151408d7/Environmental-Issues-and-Sustainable-Agriculture-Environmental-Issues-and-Sustainable-Agriculture.pdf#page=23.

From the arithmetic mean analysis presented in table 4, it can be statistically claimed that item 3 which states that “My organization still need to incorporate eco-efficiency strategy to ensure sustainable manufacturing practices” has the fourth most efficient response.

This strategy seeks not only to reduce waste and boost resource production, but also to guarantee little impact on ecology.

This aligns with the findings of Bianchi, Reyes and Devenin (2020) who argued that in developing countries, manufacturing organizations are in the recent time seeing Eco-efficiency as an important sustainability strategy as it enhances the progressive reduction of ecological effects and resource intensity all through the life cycle of manufacturing, to a minimum level in line with the earth's estimated carrying capacity, at competitive prices that meet human requirements and bring quality to life.¹⁵

From the arithmetic mean analysis presented in table 4, it could be statistically argued that item 5 which states that “My organization still need to incorporate material efficiency strategy to ensure sustainable manufacturing practices” has the least efficient responses.

Section 5: The third question: what are the impacts of sustainable manufacturing practices on the competitive advantage of FMCG Egyptian sectors?

S/ N	Different impacts	TOTAL	MEAN	STANDARD DEVIATION	SIG. VALUE	RANK OF STANDARD DEVIATION
1	enhances saving of cost in my organization	150	37.5	37.7357	*0.000	4
2	improves my organization's image	150	37.5	43.8964	*0.000	7
3	enhances the protection of my organization from potential harm	150	37.5	43.6893	*0.000	6
4	enhances the reduction of extraneous waste in my organization	150	37.5	36.5673	*0.000	3
5	enhances my organization's business model innovation and creativity	150	37.5	38.2764	*0.000	5

¹⁵ Bianchi, C., Reyes, V. & Devenin, V. (2020). Consumer motivations to purchase from benefit corporations (B Corps), *Corporate Social Responsibility & Environmental Management*, vol. 27, issue 3, pp. 1445-1453, doi: 10.1002/csr.1897, published on 29 January 2020, available through: <https://onlinelibrary.wiley.com/doi/full/10.1002/csr.1897>.

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6	enhances my organization's sustainable performance	150	37.5	35.6457	*0.000	1 (Most Efficient Response)
7	enhances my organization to have a competitive edge above competitors	150	37.5	35.8976	*0.000	2

Note: *Arithmetic mean is statistically significant at a level of significance. $\alpha = 0.05$

From the arithmetic mean analysis presented in table 5, it can be statistically claimed that item 6 which states that “The incorporation of sustainable manufacturing practices enhances my organization’s sustainable performance” has the most efficient response. The sustainable performance of FMCG companies in Egypt can be measured against the achievement of social, environmental, and economic goals both within and outside of the organization. In a bid to improve sustainable performance, a growing number of FMCG companies in Egypt are embracing sustainable manufacturing practices which are eco-friendly.

This is also supported by Bianchi, Reyes and Devenin (2020) who stipulated that Sustainable Performance is essential for manufacturing organizations to succeed in the global business market in the postmodern period of industrialization, even though they face a wide range of social and technological hurdles.¹⁶

From the arithmetic mean analysis presented in table 5, it can be statistically argued that item No.7 which states that “The incorporation of sustainable manufacturing practices enhances my organization to have a competitive edge above competitors” has the second most efficient response.

In order to achieve a competitive edge, FMCG companies in Egypt often make effective use of available resources; embrace eco-friendly manufacturing practices and business growth models carried out in harmony with the environment. FMCG manufacturing firms who incorporate sustainable manufacturing practices are vital to the expansion of Egypt’s economy since they produce goods at lower costs than their international competitors and they need to speed up the implementation of enterprise comprehensive green manufacturing

¹⁶ same reference.

strategy in order not to get faded away or fold up with the stringent competition they face from those incorporating sustainable manufacturing strategies.

This corresponds with the argument of Alvarado-Herrera et al. (2017), that even if small manufacturing firms have an individual sustainable environmental footprint than their larger competitors, the damage that the larger competitors do to the environment as a whole will cause the small manufacturing firms to inevitably cap their larger competitors.¹⁷

From the arithmetic mean analysis presented in table 5, it can be statistically claimed that item 4 which states that “The incorporation of sustainable manufacturing practices enhances the reduction of extraneous waste in my organization” has the third most efficient response.

The FMCG companies in Egypt who typically emphasizes the importance of sustainable manufacturing practices always finds it easy to reduce waste generation, this is because the sustainability strategies they often incorporate paves way for recycling, eco-efficiency, as well as other activities aimed at reducing waste from the sources such as reduction of product loss; reduction of waste water loss through recycling and treating of sewage generation as another valuable business model; recycling of factory and office disposables; adoption of renewable energy consumption such energy generated from water, wind and sunshine among others.

This aligns with Alvarado-Herrera et al. (2017) who holds and reiterated that incorporating sustainable solutions allows businesses to get rid of extraneous waste during daily operations. The overarching goal is to encourage cost cutting across the board so that more may be

¹⁷ Does corporate social responsibility really add value for consumers?, First Edition, published on 2010, written by Alejandro Alvarado-Herrera, Enrique Bigné-Alcañiz, Rafael Currás-Pérez, Joaquín Aldás-Manzano, Book title: Innovative CSR, eBook ISBN: 9781351279000, available through:

<https://www.taylorfrancis.com/chapters/edit/10.4324/9781351279000-9/corporate-social-responsibility-really-add-value-consumers-alejandro-alvarado-herrera-enrique-bign%C3%A9-alca%C3%B1iz-rafael-curr%C3%A1s-p%C3%A9rez-joaqu%C3%ADn-ald%C3%A1s-manzano>.

accomplished with less. Organizations can reap the benefits of sustainability initiatives and any subsequent new ideas.¹⁸

From the arithmetic mean analysis presented in table 5, it can be statistically argued that item 1 which states that “The incorporation of sustainable manufacturing practices enhances saving of cost in my organization” has the fourth most efficient response. The FMCG companies in Egypt aim to create some kind of product or service at the lowest possible price while yet making a profit and living up to its responsibilities to the community. Adopting cost-cutting measures that are both sustainable and beneficial to the organization is the bottom line of sustainable manufacturing practices. Sustainable manufacturing practices promotes the use of fewer resources in the manufacturing process, encourages the recycling of waste which could effectively save cost, reduces waste products and innovatively make use of waste as essential products in the production processes.

From the arithmetic mean analysis presented in table 5, it can be statistically argued that item 5 which states that “The incorporation of sustainable manufacturing practices enhances my organization’s business model innovation and creativity” has the fifth most efficient response.

It could be agreed that there is always need for the development of new business models through innovation and creativity within a progressive business organization.

The recycling of both solid and liquid waste is considered as an innovative and creative approach which could serve as a new business model. This corroborates with Ambrose, Goodchild & O’Flaherty (2017) who argued that in terms of expanding a company, sustainable practices allow businesses to try out new markets, roll out new products and services, and make innovation a central tenet of their operations.¹⁹

¹⁸ Alvarado-Herrera, A. A., Bigne, E., Aldas-Manzano, J. & Curras-Perez, R. (2017). A Scale for Measuring Consumer Perceptions of Corporate Social Responsibility Following the Sustainable Development Paradigm, *Journal of Business Ethics*, vol. 140, no. 2, pp. 243-263, doi: 10.1007/s10551-015-2654-9.

¹⁹ *Energy Research & Social Science*, Volume 34, December 2017, Pages 163-171, written by Aimee Ambrose, Barry Goodchild, Fin O’Flaherty.

From the arithmetic mean analysis presented in table 5, it can be statistically argued that item 3 and 2 which state that “The incorporation of sustainable manufacturing practices enhances the protection of my organization from potential harm and improves my organization’s image” has the sixth and seventh least efficient responses respectively, i.e., are not very usable for the incorporation of sustainable manufacturing practices among FMCG companies in Egypt.

Section 6: The fourth question: what are the Challenges facing the FMCG Egyptian sectors in implementing sustainable manufacturing practices, i.e., the challenges that hinder the full implementation of sustainable manufacturing practices?

S/N	Different challenges	TOTAL	MEAN	STANDARD DEVIATION	SIG. VALUE	RANK OF STANDARD DEVIATION
1	My organization’s lack of education and awareness about the need for sustainability	150	37.5	36.3377	*0.000	3
2	Fear of the unknown in my organization	150	37.5	37.8997	*0.000	4
3	High cost of implementation of sustainable manufacturing practices	150	37.5	35.9967	*0.000	2
4	Limited incentive mechanism	150	37.5	44.8710	*0.000	6
5	Contradiction between corporate and social responsibility	150	37.5	43.7851	*0.000	5
6	Limited technical capacity	150	37.5	35.6876	*0.000	1 (Most Efficient Response)

Note: *Arithmetic mean is statistically significant at a level of significance. $\alpha = 0.05$

From the arithmetic mean analysis presented in table 6, it can be argued that item 6 which states that “Limited technical capacity hinders the full implementation of sustainable manufacturing practices in my organization” has the most efficient response.

It is undisputable that enhancing and implementing the eco-friendly practices requires technical capability, for example, the recycling of liquid waste for further use, moreover, the adoption of wind energy which is a renewable and eco-friendly source of energy for powering the activities of these firms requires adequate technological and technical skills which the majority of the manufacturing FMCG do not have, hence, this is considered as a major challenge that hinders the implementation of sustainable manufacturing practices.

This corroborates with Buerke et al. (2017) who listed the general limitations that must be overcome when trying to implement sustainable solutions within an organization, and they are as follows: technological barrier or inadequate technological skills, limited accomplishments, good value in procurement processes, inadequate knowledge on how to evaluate progress, and high costs associated with implementing sustainable strategies all play a role²⁰.

From the arithmetic mean analysis presented in table 6, it can be statistically argued that item 3 which states that “High cost of the implementation procedures hinders the full implementation of sustainable manufacturing practices in my organization” has the second most efficient response.

Sustainability faces a significant challenge from the imperative to survive in growing economies around the world. Although well-implemented sustainable solutions result in large benefits, these techniques are often linked with high costs. Most developing countries' emerging business organizations cannot afford to aim for sustainability. This corresponds with the findings of Chappin, Bijvoet & Oei (2017) that there are many challenges that arise when attempting to embed sustainability within manufacturing

²⁰ Buerke, A., Straatmann, T., Lin-Hi, N. & Müller, K. (2017). Consumer awareness and sustainability-focused value orientation as motivating factors of responsible consumer behavior, *Review of Managerial Science*, vol. 11, issue 4, pp. 959-991, doi: 10.1007/s11846-016-0211-2.

Buerke, A., Straatmann, T., Lin-Hi, N. & Müller, K. (2017). Consumer awareness and sustainability-focused value orientation as motivating factors of responsible consumer behavior, *Review of Managerial Science*, vol. 11, issue 4, pp. 959-991, doi: 10.1007/s11846-016-0211-2.

organizations, such as a lack of knowledge towards the issue, embedding sustainable strategies resulting in higher manufacturing costs, a pessimistic view towards the matter due to high costs for implementation.²¹

From the arithmetic mean analysis presented in table 6, it can be statistically claimed that item 1 which states that “My organization’s lack of education and awareness about the need for sustainability hinders the full implementation of sustainable manufacturing practices” has the third most efficient response.

Since most managers do not have enough data to make informed decisions, most FMCG companies compete only on economic terms and are readily displaced from their market positions by new companies with new strategies. For instance, many managers do not even know what is meant by sustainability talk less of imbining it into their organizational activities.

This corroborates with Dvir & Gafni (2018) who argued that the main reasons for this is that managers often lack direction, education and awareness when determining what drivers and concerns are relevant to their organization; organizations often lack a clear idea or concept of what is sustainability within their firm, resulting in general misunderstanding and different opinions even among members of the same organization; and organizations often lack awareness of what could be the significant advantages and are therefore unable to act on them.²²

From the arithmetic mean analysis presented in table 6, it can be statistically claimed and argued that item 2 which states that “Fear of the unknown hinders the full implementation of sustainable manufacturing practices” has the fourth most efficient response.

²¹ Teaching sustainability to a broad audience through an entertainment game–The effect of Catan: Oil Springs, E.J.L. Chappin, X. Bijvoet, A. Oei, *Journal of cleaner production* 156, 556-568.

²² When less is more: empirical study of the relation between consumer behavior and information provision on commercial landing pages, Nim Dvir, Ruti Gafni, *Volume 21*, 2018.

Most of the FMCG companies who are into manufacturing always have the fear of not making themselves relevant in the business world or in the market, they often keep asking questions like, who has tested this before? what are the results they got? how did they go about it? will this not ruin my existing business model? Fearing the unknown, many FMCG companies stick to tried-and-true methods of doing business in the hopes of ensuring their continued success.

This is in alignment with Ashrafi et al. (2018) who pointed out that businesses are not always sure they should include sustainable practices into their operations due to lack of the appropriate data required to make decisions, making it challenging for managers to prevent significant losses. Additionally, there is typically no defined business reason for value generation, resulting in unclear goals and fear of what the future holds. Organizations are often misled when they decide to pursue sustainable methods as a competitive advantage, which leads to subpar implementation and ultimately, no tangible value.²³

Lastly, from the arithmetic mean analysis presented in table 6, it can be statistically claimed and argued that item 5 and 4 which state that “Contradiction between corporate and social responsibility and limited incentive mechanism hinder the full implementation of sustainable manufacturing practices in my organization” has the fifth and sixth least efficient responses respectively.

²³ Ashrafi, M., Adams, M., Walker, T. R. & Magnan, G. (2018). ‘How corporate social responsibility can be integrated into corporate sustainability: a theoretical review of their relationships’, *International Journal of Sustainable Development and World Ecology*, vol. 25, no. 8, pp. 672-682, doi: 10.1080/13504509.2018.1471628.

Conclusion

In conclusion, sustainable manufacturing practices should be understood as those that aim to reduce negative impacts on the environment, the economy, and society. It could be considered as the main target which will lead to the realization of Egypt's vision 2023.

Sustainable manufacturing in the FMCG Egyptian sector is the biggest field to implement the sustainable plan.

The organizations have many reasons to be motivated to implement and incorporate sustainable manufacturing practices, whether because of the need to be an environmentally responsible organization, or to reduce operating cost, it could also be because of the government regulations/legislative pressure, or in order to a socially responsible organization, or even because of reputation maintenance or improvement, the stakeholders' pressure and even because of having top management commitment.

The organizations need to have a strategy in order to incorporate to ensure sustainable manufacturing practices in FMCG Egyptian sectors. The organizations still need to incorporate waste minimization strategy, an energy efficiency strategy, a natural resource efficiency strategy, an eco-efficiency strategy and a material efficiency strategy.

Various impacts of the sustainable manufacturing practices on the competitive advantage of FMCG Egyptian sectors are proved, it could enhance the sustainable performance, having edge above competitors, the reduction of extraneous waste, saving operations costs, enhancing business model innovation and creativity, protection from potential harm and improving the organizations' images.

The organizations must be aware of the challenges that might face them while implementing the sustainability plan and hinder the implementation process such as limited technical capacity, the high cost of the implementation procedure, lack of education and awareness about the need for sustainability, the fear of the unknown, the contradiction between corporate and social responsibility and of course having a limited incentive mechanism.

Businesses' survival and ability to compete in the market in the recent times are reliant on their internal processes and their capacity to

respond to structural changes such as incorporating sustainable practices, technological advancements, and innovation in the presence of new competitors. Therefore, manufacturing enterprises shouldn't consider environmental sustainability and protection efforts as a threat to their company operations but rather an opportunity.

Recommendations

FMCG Transition Action plan must be set out of range of targets and actions designed to deliver an emissions reduction pathway and set a primary focus on emissions reduction, not offsetting coming firstly from each organization own operation from factories, offices, labs through set of calculations beginning from raw materials (including third Parties), packing materials, logistics and distribution, retail emissions, disposable waste products, and packing and indirect use emissions phase.

Based on the findings from the study, fundamental shifts regarding sustainability in manufacturing firms should be mandated for all managers. There is need for a change from mere talking about sustainability to really involving in putting into force sustainability activities across several business organizations in all sectors.

Sustainable manufacturing practices are driven by government rules, regulations, legislation, and a company's competencies; therefore, governments should take the initiative to re-evaluate their policies, tighten environmental regulations, and allocate more resources to ensure that these practices are followed correctly.

A time frame drawn by the government for the organizations to follow, might help and urge them to execute what is required to make sure that the sustainability plan is being implemented in order to achieve Egypt's vision 2030.

Corporation between the organizations and auditing companies registered in Egypt in order to promote the brands' position and align to global standards.

Organizations should shift their focus from acting solely in the best interests of shareholders to fostering positive relationships with a

variety of constituencies concerned with sustainability and environmental protection.

Cooperation between different ministries in setting up the rules and restrictions, also to implement innovative approaches to achieve the global sustainable plan.

In addition, manufacturing companies' stakeholders need to do more to adopt eco-friendly procedures. FMCG manufacturing firms have a responsibility to make substantive improvements in environmental sustainability at all operational levels.

Government agencies responsible for monitoring environmental sustainability in Egypt and in other countries should do well to create programs, lectures and workshops to educate manufacturing organizations on the importance of implementing sustainable manufacturing practices and the know-how.

The consumer is a main factor in the sustainability development, an educational program must be implemented in order to educate the Egyptian citizen, who has the right to live safe, informed and conscious of all the objectives of the development plan, in order for him to always choose the right choice in its daily activities.

Most of the foreign investors consider the sustainability as a required condition in the industry which they are aiming to deal with. Therefore, each industry should prepare itself and implement the required conditions to attract investors from all over the world.

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