

# Sustainable Manufacturing framework from Islamic Perspective

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**Abstract.** Islam is a complete way of life and offers holistic and comprehensive solutions to the human life. Manufacturing is one of the fields in which the voice of Islam is hardly heard. The efforts to relate and integrate manufacturing practices with Islamic principles and to eventually create a holistic solution is still lacking. This study is an attempt to develop a framework of sustainable manufacturing practices from the Islamic perspective. This framework may offer optional solutions to the current problems faced by the world such as global warming, climate change, pollutions, diseases etc. due to human ignorance. The framework was developed based on a preliminary research on the recent study of Maqasid Shari'ah, which is used as the main foundation. The developed framework comprises of three main domains, namely social, economic and environment. The framework is hoped to offer alternative solutions in producing high quality products, whilst taking into consideration the society, economy and environment, in line with the teachings of Islam and in accordance to our subservience to Allah SWT.

## 1. Introduction

The global manufacturing sector continues to grow and remains critically important to most developed and developing countries, socially and economically. Manufacturing activities, on the other hand, have enormously contributed to many adverse environmental problems such as the depletion of natural resources, the increase in global warming, global climatic changes and pollutions due to an inherent increase in the consumption of resources, high levels of consumption in energy and materials, inefficient factory operations as well as high volumes of waste generation [1]. Sustainable development and sustainable manufacturing have been introduced to respond to the problem in a holistic and global manner.

Sustainable manufacturing can be defined as “the creation of manufactured products that use processes that minimize negative environmental impacts, conserve energy and natural resources, are safe for employees, communities, and consumers and are economically sound” [2]. Since a decade ago, several sustainable manufacturing frameworks have been developed to respond to the alarming



global concern and in line with that, some manufacturers have embraced sustainability in their corporate strategy [3]. In this study, an alternative framework of sustainable manufacturing has been established. The framework is developed as an attempt to highlight Islam as a holistic solution provider to the current social, economic and environmental problems faced globally. Even though there is a serious lack in efforts to relate Islam and manufacturing in the literature as well as in manufacturing practices, the motivation of this study is the belief that Islam provides complete guidance for all aspects of life, be it individual, social, political, environmental, economic and international. A preliminary research on the recent studies of the Maqasid Shari'ah has been used as the main foundation in developing the sustainable manufacturing framework.

## **2. Literature Review**

### *2.1 Sustainable Manufacturing Framework*

In this research, several recent sustainable manufacturing models and frameworks are discussed and referred to in developing a new framework. In 2009, Kibira D et al. proposed a framework that encompasses four interacting complex domains which include the three common domains of environmental, financial and social, as well as the manufacturing domain [4]. The proposed framework also highlights a set of influential factors within each domain which has been identified in an acceptable common taxonomy and was designed to be pertinent to the modelling of sustainable manufacturing from the global level to the community level [4]. In the same year, the Organisation for Economic Co-operation and Development (OECD) which was based in Europe, took an advanced step by developing a sustainable manufacturing toolkit in the form of comprehensive universal indicator sets [5]. The main function of the toolkit is to support the end users to benchmark the environmental performance of manufactured products and processes in relation to financial viability [5].

Meanwhile, in 2012, Dombrowski U et al. proposed a more practical framework by analysing the existing Lean Production System and attempting to incorporate the social and environmental sustainability elements in production activities. [6]. The focus of the framework, however, was restricted in the design and production activities only. One of the recent proposals of sustainable manufacturing framework was developed by Ocampo L and Ocampo C O in 2015. Their proposed framework was an attempt to formulate a sustainable manufacturing system that is capable of maintaining the competitiveness of the manufacturers and at the same time fulfilling the demands for sustainability [1]. A common characteristic of the four proposed frameworks above, basically, is to retain or increase the sustainability of social and economic elements and at the same time enhance the sustainability in environmental element effectively and comprehensively.

### *2.2 Islam and development*

Islam represents more than a belief system, it is a well-defined set of values providing specific guidance for essentially every aspect of life, applicable in all times and places. Within its firmly established principles and values, Islam has all the essentials that correspond to development to adopt modern ideas and technologies that can improve life. In the framework of the religion, Islam offers inspiration which can be translated into policies, regulation and law for development in order to achieve a sustainable relationship between mankind and the natural world created by Allah SWT. Islam offers great advantage for environmental conservation, protection and sustainable development alongside with the sustainability in society and economy. The recent global environment crisis has brought Islam into the limelight. The crisis offers an opportunity for Islam to become a significant option as a solution provider for the global manufacturing industries.

### *2.3 The Framework of Maqasid Shari'ah*

Maqasid Shari'ah is translated as the objectives behind the Islamic rulings (shari'ah). In a more specific manner, Maqasid Shari'ah is the aims or fundamental purposes of Shari'ah upon which it was established [7,8]. In general, Maqasid Shari'ah is considered to be the grand framework that provides the basic philosophical foundations that give guidelines and directions for ensuring the realisation of maslahah (benefit) and the prevention of mafsadah (harm) in any element [7,9]. It is important to understand the meaning of the shari'ah itself before discussing further the concept of Maqasid Shari'ah. In this regard, al-Qayyim I (1993) stated that "The foundation of the Shari'ah is wisdom and the safeguarding of people's interests in this world and the next. In its entirety it is justice, mercy and wisdom. Every rule which transcended justice to tyranny, mercy of its opposite, the good to the evil, and wisdom to triviality does not belong to the Shari'ah although it might have been introduced therein by implication. The Shari'ah is God's justice and mercy amongst His people. Life, nutrition, medicine, light, recuperation and virtue are made possible by it. Every good that exists is derived from it, and every deficiency in being results from its loss and dissipation for the Shari'ah, which God entrusted His prophet to transmit, is the pillar of the world and the key to success and happiness in this world and the next" [10].

From the above definition, in a broad sense, Shari'ah can be regarded as a significance mechanism to offer solution to the modern and global crisis. Maqasid shari'ah, therefore, is not only deals with the modes of worship for the individual, but also proposes directives for a collective life containing various aspects such as socio-economic affairs, politics, health and protection of diseases, global warming, climate change as well as international relations [11].

Maqasid Shari'ah has evolved since its introduction as a branch of knowledge in Islamic studies. Imam al-Shātibī (14th century), a great scholar from Andalusia, who is the renowned master architect of Maqasid Shari'ah, divided the general objectives of shari'ah into three sub-categories: the Necessities (*darūriyyah*), the Needs (*hājiyyah*) and the Embellishments (*taḥsīniyyah*) [12]. The categories are briefly discussed below:

(1) The Necessities (*Darūriyyah*) can be explained as the interests of lives which people essentially depend upon, and whose neglect leads to total disruption and chaos in the society [7,8]. Since the introduction of Maqasid Shari'ah, this primary component, basically, comprises of the five objectives of the shari'ah: protection of faith (*dīn*), life (*nafs*), intellect (*'aql*), posterity (*nasl*) and wealth (*māl*) [7, 8]. Recently, in line with the flexibility of the shari'ah, two more essential elements of Necessities have been introduced, i.e. protection of environment (*bi'ah*) and health (*sihah*) [11]. These seven elements of necessities are essential as the foundation for the establishment of peace and well-being in this world and the hereafter.

(2) The Needs (*Hājiyyah*) can be defined as "the interests that supplement the essential interests" [7]. This component is required to free the society from distress and difficulty by lightening hardships in applying the Necessities.

(3) The Embellishments (*Taḥsīniyyah*). This component refers to the interests whose "realization leads to improvement and the attainment of that which is desirable" [12]. Examples of this component are the avoidance of lavishness in consumption, cultivation of fortitude and observance of cleanliness in personal appearance.

### 3. Result and Discussion

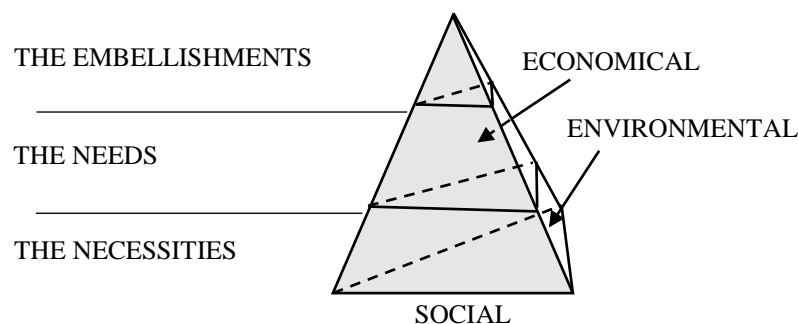
#### 3.1 Integrated framework of Sustainable Manufacturing

In the last decade, the concept of Triple Bottom Line [13,14] which comprises of the three domains of sustainable development; social, economic and ecological/environment has emerged [15]. Nowadays, the established consensus acknowledged globally is an equal consideration of the three domains [16].

In manufacturing, nevertheless, the actualisation of the concept from macro to intermediate level is still far from perfect [6]. The challenge is to create a healthy and long term competitiveness of manufacturing players by minimizing the use of natural resources and producing eco-friendly waste generation, and at the same time enhance the quality of life of the stakeholders as well as society [13].

Meanwhile, frameworks based on the Maqasid Shari'ah have been developed and successfully implemented in various sectors especially in the financial (banking, takaful etc.) and political (policies, acts, etc.) sectors [8,9]. The big question that may be asked in this study is how to integrate between the Triple Bottom Line of sustainability and the principles of Islam, in this case, the Maqasid Shari'ah. In another word, how to develop a framework of Sustainable Manufacturing based on the principles in the Maqasid Shari'ah. The first approach applied in this study was integrating the five + two elements of the Necessities (*Ḍarūriyyah*) in Maqasid Shari'ah with the three domains in the Triple Bottom Line framework.

From the authors' perspectives, the seven elements of the Necessities in the Maqasid Shari'ah can be integrated into the three domains of sustainability in the Triple Bottom Line. The Protection of wealth (*māl*) and the protection of environment (*bi'ah*) can be directly matched to the economical and environmental domains respectively. Meanwhile, the remaining elements which are the protection of faith (*dīn*), life (*naḥs*), intellect (*'aql*), posterity (*nasl*) and health (*sihḥah*) can be integrated into the social domain as the elements are clearly related to the establishment of social well-being. The structure for this integrated framework can be displayed by a three-sided pyramid as shown in figure 1, where each side represents a domain of sustainable manufacturing.

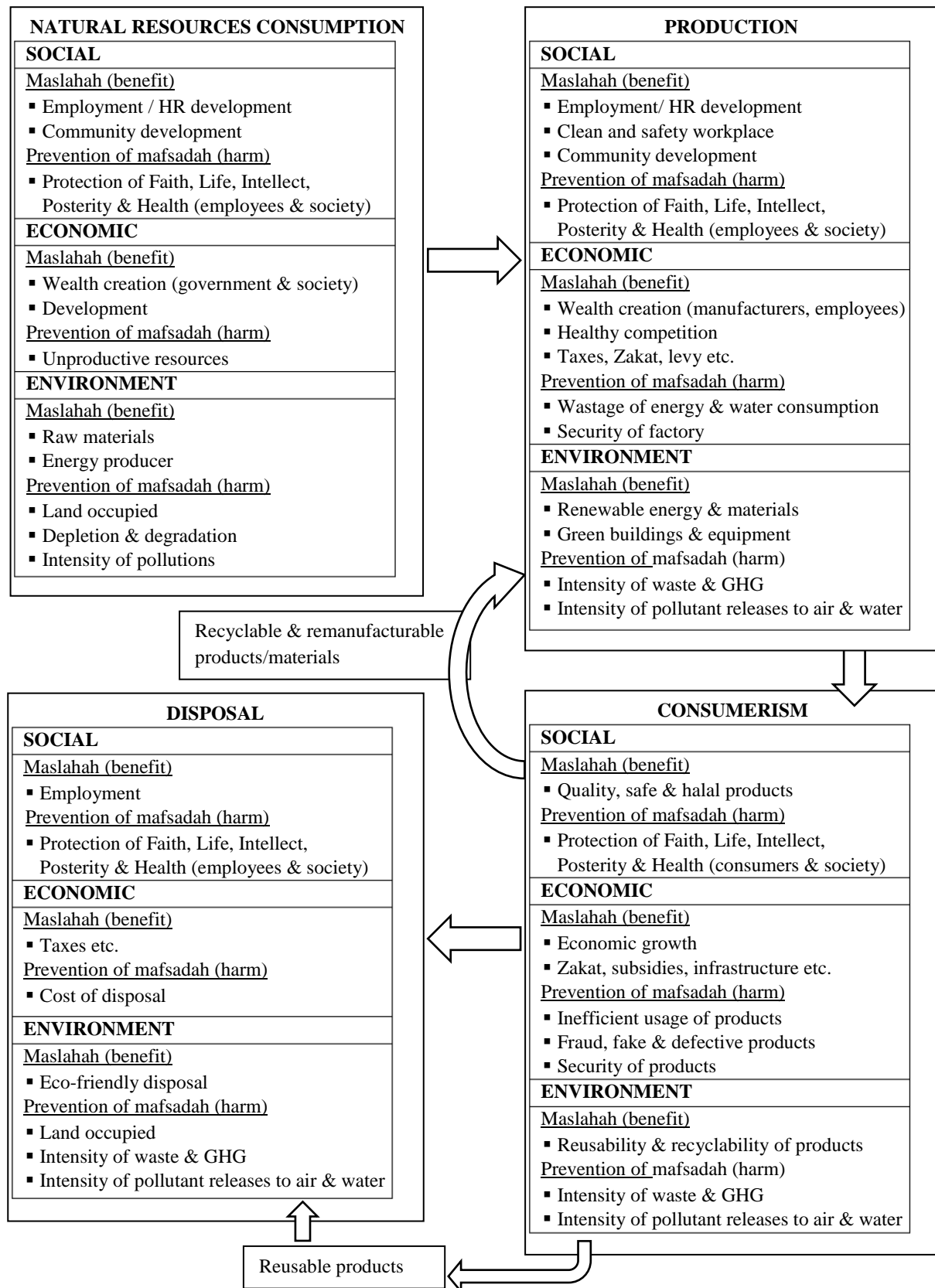


**Figure 1.** The structure of the integrated framework of Sustainable Manufacturing.

### 3.2 Sustainable Manufacturing Framework based on the Maqasid Shari'ah

The next phase of the framework development is more significant. At this stage, the elements of Maqasid Shari'ah are embedded and infused into the manufacturing activities, based on the structure of integrated framework which has been developed beforehand. The framework of sustainable manufacturing proposed in this study is shown in figure 2. The framework incorporates manufacturing activities which are divided into four main components, i.e. Natural Resources Consumption, Production, Consumerism and Disposal.

Manufacturing activities are normally initiated with the extraction of natural resources from eco-systems and mines to provide the raw materials as well as to generate energy to support the production operation. Manufacturers and industrialists as the vital players in manufacturing industry, they consume the raw materials for the purpose of developing and producing products, whether existing or new, and sell the products to fulfil market demands [4,5]. End users, subsequently, use the products in accordance to their needs until eventually disposing the products after they are considered to have no further use. In each component in the proposed framework, all of the three domains of sustainability are incorporated, as an approach to optimize the interaction between the domains in gaining sustainability. Furthermore, in each domain, two crucial elements of Maqasid Shari'ah; *maslahah* (benefit) and prevention of *mafsadah* (harm) are embedded and outlined more specifically.



**Figure 2.** A proposed framework of Sustainable Manufacturing based on Islamic perspective.

Basically, the focal point of the framework is the social domain. This statement may look biased, but the fact is to achieve a decent standard of living, the society definitely needs economic stability and a healthy environment. In manufacturing, society can be categorised into three groups; business resources (employers, employees, suppliers), clients/consumers and communities who are not involved directly in any of the manufacturing activities. The employers, employees and suppliers involve in many activities at the workplace that may lead to accidents, diseases and psychological effect such as stress. The risk of this group being exposed to accidents and diseases is higher than other groups. Meanwhile, the clients and consumers may be exposed to the risks when they are using the products. The community, while not being involved in any manufacturing activities directly, can also be exposed to some risks but the level of risks are considered the lowest among the groups.

As mentioned earlier, there are five elements of necessities in Maqasid Shar'iah which have been integrated in the social domain in the framework. All of the groups need protection of faith (e.g. for Muslim, from products that may lead to polytheism), protection of life (e.g. from death and injuries), protection of intellect (e.g. from materials/products/activities that weaken the mind), protection of posterity (e.g. from materials/products/activities that harm the reproductive system) and protection of health (from diseases). The holistic and strict protections can be executed by introducing, implementing and enforcing suitable acts, regulations and rules as well as inculcating positive cultures among the society. The consumers, specifically, should enjoy consuming quality, safe and value-for-money product(s) produced by the industry in the most efficient manner. This group should be protected from fake and defective products and also non-halal products (for Muslim). Moreover, manufacturing activities offer a great deal of employment opportunity to the community. As a result, the authority needs to plan an excellent human resources development programme by providing better education and training system as well as developing sufficient infrastructure to support the manufacturing activities. This will significantly boost the development in the area and consequently enhance the quality and standard of living of the society.

Wealth accumulation and management are very crucial at the organisation level such as the government, manufacturers, and retailers as well as at the family/individual level. In the proposed framework, all of the parties should enjoy financial benefits (*maslahah*) from the manufacturing activities, and simultaneously avoid any financial problems and crises (*mafsadah*). In general, manufacturing activities may boost business activities, hence generate income to the government, manufacturers, retailers, stakeholders as well as employees. The consumers and society, meanwhile should obtain indirect financial benefits such as subsidy, zakat, scholarship etc. On the other hand, the framework suggests prevention of financial problems such as security of factory/workplace (from fire, flood etc.), cost-effectiveness of operations, restriction of frauds and fakes, avoidance of defective products, and minimised costs of operations and disposals. The ultimate objective of this economic domain is to create wealth for the stakeholders, increase economic growth and finally benefit the society.

Due to the increasing global environment problems, the environmental domain in the framework may be given an immense amount of attention. In the first place, the framework suggests efficient planning of extraction and consumption of natural resources by optimizing the land consumption, increasing the use of renewable resources (energy and raw materials) as an alternative and minimising the consumption of non-renewable resources (metals, oil, gas, coal, etc.). At the production sites, the framework suggests efficient usage of energy and water for operation, increase in the consumption of renewable raw materials, increase in the development of products that can be recycled and remanufactured, and equipping the factory with green technology. The manufacturing players are also suggested to eliminate or at least minimise the generation of emission and waste to the air, water or soil as well as the emission of noise as much as possible.

Consumers hold a huge responsibility in contributing to environmental sustainability. In the first place, they should choose to purchase products that has environmentally friendly characteristics such as reusable, recyclable, remanufacturable and can be disposed in the eco-friendliest manner. Then,

they must use the product efficiently and minimise waste as much as possible. This habits will significantly help reduce the air and water pollutions and create healthier environment in a long run. Finally, in the disposal components, the framework suggests more protection of land for landfill and introducing eco-friendlier solutions of waste management.

#### 4. Conclusion

Sustainable manufacturing is a response to the increasing deterioration of the global environment due to uncontrolled and unsustainable manufacturing activities in the ever globalizing market. This strategy is in line with the principles of Islam where Islam encourages interaction, optimization and balance of the three main domains in sustainability; social, economic and environment. This paper has proposed a framework of sustainable manufacturing based on the preliminary research of recent studies on the Maqasid Shari'ah. The framework was developed by embedding and infusing the elements of Maqasid Shari'ah into the manufacturing activities, based on the initial structure of integrated framework. The proposed framework was further established by outlining the elements of the maslahah (benefit) and prevention of maslahah (harm) in each domain of every component. This framework is an initial effort to expand the application of Maqasid Shar'iah as a framework in the manufacturing sector. The proposed framework, hopefully, will be improved continuously and expanded in more specific function in each manufacturing activity.

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