



THE APPLICATION OF THE GREEN INNOVATION VALUE CHAIN AND ITS ROLE IN RATIONALIZING COSTS

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Article history:	Abstract:
<p>Received: 4th November 2022 Accepted: 6th December 2022 Published: 6th January 2023</p>	<p>With the rapid development witnessed in current days in variety of aspects, the innovation element is one of the important elements that economic units must take into consideration, due to its future effect on the economic unit's position in the market. This research aims to study the use of the innovative green value chain in rationalizing costs, the research used a questioner form distributed to General Company for Textile and Leather Industries as the research sample. The targeted sample of respondents have the required knowledge and involvement in the main activities effected by the usage and application of green value chain in an economic unit. The results indicate that the usage of innovative green value chain not only reduces pollutant emissions, but can also as in costs rationalization</p>

Keywords: green innovation , value chain , rationalizing costs , activities value chain .

INTRODUCTION

For many years a variety of scholarly literature has encouraged organizations to (green) their manufacturing, distribution, and products as a strategic path that will provide them and society with both environmental and economic benefits (e.g. Porter and van der Linde, 1995, Porter and Reinhardt, 2007; Unruh and Ettenson, 2010). The evolution of green technology diffusion prospects requires a multi-stakeholder perspective that encompasses both the supply-side (i.e. suppliers, manufacturers and distributors) and demand-side (i.e. end-users) (Enflo, Kander, and Schon, 2008) . Value-chain analysis traditionally focuses on the positive and negative financial implications that activities such as logistics, operations, and marketing/sales can have on the costs and pricing power of a firm's product , Within the environmental arena, Porter and Reinhardt (2007) further suggest a ratio of profits to total emissions as a metric for evaluating the climate impact of each value-chain activity within the firm.

Therefore, the innovation element is one of the important elements that economic units must take into consideration, due to its future effect on the economic unit's position in the market. Therefore, new and rapid innovations in the products or services adopted by the unit are considered a competitive advantage.

Thus, the green manufacturing innovative chain will work directly on reducing or eliminating everything that harms the environment to provide a pure and appropriate environment and to manufacture quality products free of any manufacturing waste during the stage of the green value chain (manufacturers and distributors).

1.1 Research Problem:-

Many economic units suffer from not keeping pace with developments in industrial environments, as a result of their application of dilapidated traditional systems, which have become a burden on the unit itself. Therefore, these systems do not take into account environmental pollutants and carbon emissions, which are directly reflected on the internal and external environment as well as The costs borne by the economic unit, including fines as a result of environmental pollution due to dilapidated and old equipment and devices, and this requires finding a quick and immediate solution to eliminate such forms of pollution.

1.2. Research Hypothesis:-

Through the abolition and deletion of non-value-adding activities, as well as the introduction of modern techniques and technologies that reduce pollution and carbon emissions that can eliminate the costs of fines, taxes and other costs, the research hypothesized the following:

H1: The application of the innovative green value chain will rationalize costs

1.3. Research Aim:-

1- Identify the concept and activities of the innovative value chain.

2- Analyzing the activities of the value chain according to the structure of the economic unit, identifying the value-adding activities and excluding the non-value-adding ones.

3- Elimination of carbon emissions resulting from the production process, as well as the production of environmentally friendly products in accordance with technical, technological and administrative changes and at all stages of the innovative green value chain.



1.4. Research Importance:-

The importance of the research stems from the value of its outputs and the results it reached, by working to develop all the staff concerned with the green value chain in the economic unit by introducing them to training courses, as well as working to urge the staff to complete postgraduate studies as well as keeping pace with modern technologies and learning about them, and that All this is considered one of the basis of the transformation to innovation as well as the production of environmentally friendly (green) products, and it can also be recycled again in the event of damage, and work on it will either produce a product or rehabilitate it to be an effective and non-perishable product, and therefore this will increase the capital The economic unites well as taking space from the market, and the economic unit is able to survive and compete through sustainable green production and after-sales services

LITERATURE REVIEW

2.1 The concept and definition of the green value chain

The concept of the green value chain is one of the modern concepts that have attracted the attention of researchers due to its interest in environmental controls as well as the activities of the economic unit:

The value chain is an organized way to improve the value of goods or services through the use of tests and studies of functions, that is, it reduces costs without violating the requirements of quality and basic functions, so it is sometimes known as the ratio of function to cost (Horngren et, al., 2012 ;6). Whereas innovation is defined as the economic unit that has competitive advantages based on innovation is the one that includes innovation in a broad sense within its units, activities and strategies, through the introduction of new technology or carrying out innovative operations at the same time (Ttidd, et al., 2010 :188) As for the green value chain, it can be defined as the set of activities that start with research and development and end with recycling and disposal of the product, which Environmental requirements are taken into account at every stage of product formation to reduce waste and waste of resources and unnecessary expenditures (Kung & Huang, 2012: 112)

It is a set of environmentally friendly activities that seek to protect the environment, improve internal processes, and apply carbon-neutral strategies to create green products that add value to the customer and achieve a sustainable competitive advantage.(Couto, et al., 2016 :2)

It is a set of activities practiced to ensure optimal consumption of natural resources, as well as increasing

the share of renewable and recycled resources on the input side to maximize resource and energy efficiency at every stage of operations, to reduce negative environmental impacts as outputs at all points of the green value chain (Ong et al 2019: 496).

The green value chain can be defined as an integrated set of activities that support the potential for the production of environmentally friendly goods and services, which are consistent with the requirements of environmental sustainability at all stages of manufacturing, by reducing carbon emissions and air pollution and reducing the volume of production waste, as well as recycling products. expendable and disposed to achieve a competitive advantage (Muhammad, Obeid,2021:251)

The researcher defines the green innovative value chain as:

A set of innovative improvements (introducing new technologies or making innovative modifications) to all activities or internal processes, from the stage of environmental research and development to the stage of environmental recycling, for the purpose of producing an environmentally friendly product that achieves a sustainable competitive advantage .

2.2 Innovation characteristics

Innovation has many characteristics through which differentiation is achieved from these characteristics. (Sudani, 2015:230)

1. Innovation generates new wealth
2. Innovation means differentiation
3. Innovation brings utility, appeal, and acceptance
4. Choosing the right time to present the innovative product

2.3 Types of innovation:

Innovation has many types, and among these types is innovation according to the nature of innovation. This type is divided into (Sudani, 2015:230) :

- 1- Technological innovation: It can be defined as every new or every small or large improvement in products and production methods that takes place in an individual or collective concept, and which proves technically and technologically successful for the purpose of improving productivity and reducing costs.
- 2- Organizational innovation: It is the process of successful exploitation of new ideas that increase the efficiency of the use of human resources, that is, the introduction of changes to management, work organization, working conditions, and workforce skills.



3- Marketing innovation: It is intended to put new ideas into actual application of marketing practices.



Figure1: innovation as an end-to-end process rather than focusing on a part allows you to spot both the weakest and the strongest links.

Intra unity	Selection: screening and	Dissemination across the
Inter unities	initial funding	organization
External (collaboration)	Development: from idea	
	to results	

*The innovation value chain by Hansen and Birkinshaw (2007)

2.4 The importance of the green value chain

To build the activities of the green value chain in the industrial units, the most important of which are: (Abdul Qader, Al-Samarrai, 2019:56) (Al-Gharabawi,et.al,2021:34)

1- Achieving a sustainable and continuous competitive advantage for the longest possible period, due to its commitment to environmental legislation and laws, and also to meet the desires and requests of customers by providing green products that are safe for human health, in addition to reducing pollution rates.

2- Contracting with suppliers who take into account environmental controls in order to improve the quality of products as well as the efficiency of production processes through the use of cleaner production techniques.

3- Preserving natural resources and optimal consumption of energy by reducing the amount of raw materials used in production, which can be recycled.

4- Improving the reputation of the organization as a result of its contribution to reducing pollution rates and creating green products.

5- Reducing costs by reducing waste, gases and toxic fumes, which lead to a reduction in fines and taxes.

6- Using the green value chain of clean technologies results in reduced handling and maintenance costs.

7- Reducing waste by designing recyclable products or final disposal.

2.5 Weaknesses of the innovation value chain

Each stage of the innovation value chain has a set of weaknesses, which will be identified as follows (Hansen,2007:1)

Phase	Is weak if...	Is weak i
Idea generation	Collaboration within units	People within units can't generate good ideas on their own..
	Collaboration across units	People collaborating across units don't produce good ideas.
	Collaboration with outside parties	Your company doesn't source enough good ideas from customers, competitors, inventors, and other external parties..
Idea conversion	Screening and funding of new ideas	Your screening and funding criteria are so strict that they shut down most ideas, or so loose that your company over flows with projects that don't fit your strategy..
	Developing ideas into viable products, services, or businesses	Ideas selected for further development languish in parts of your organization that are too busy doing other things or that don't see their potential..
Idea diffusion	Spreading developed ideas within and outside the company	Developed ideas don't get buy-in from customers, internal constituencies, distribution channels, or desirable geographic locations..

2.6 Strengthening weaknesses and making them stronger

The table below shows a set of practices that make weak points stronger(Hansen,2007:1)



If your company has difficulty.	Consider these practices.	Examples
Idea generation	Build external networks	At Procter & Gamble, in-house product developers translate customer needs into technology briefs describing problems needing resolution. Briefs go to technology scouts, suppliers, research labs, and retailers worldwide to elicit solutions.
	Build cross-unit networks	P&G has communities of practice, each comprising volunteers from different parts of the organization and built around an area of expertise. The teams solve specific problems and participate in monthly technology summits with representatives from P&G's business units.
Converting ideas	Provide cross unit funding	Shell Oil's Game Changer unit funds development of radical ideas, operating across major divisions with a \$40 million annual seed-funding budget. Forty percent of projects in Shell's exploration and production sectors started as Game Changer projects.
	Create safe havens	A technology firm established a separate, autonomous business unit to develop new ideas supporting the company's strategy. Successful venture managers earned hefty bonuses. Numerous ventures became viable businesses with combined annual revenues of £100 million.
Diffusing ideas	Designate "idea evangelists"	Sara Lee's Sanex shower products encountered resistance from several country managers. A division president won them over by repeatedly visiting them and hosting them at headquarters. Sanex eventually was introduced in 29 countries.

2.7 Green innovation value chain objectives

(Muhammad,2021:251) (Hansen,2007:1)

- 1- The green value chain seeks to reduce resource and energy consumption and reduce waste and pollution.
- 2- Supporting the capabilities of the economic unit in its production of green products, in a more innovative way, by translating customer needs into technical summaries describing the problem that needs a solution, and then presenting these problems to the world for the purpose of devising solutions.
- 3- Enhancing the health requirements of workers in the economic unit by converting its activities into environmentally friendly ones.
- 4- Contribute to the re-engineering of operations to reduce waste and to recycle or dispose of both productions waste and used products.
- 5- Establishing a separate and independent business unit to develop new ideas that support the company's long-term strategy.

2.8 Green Innovation value chain activities

The green Innovation value chain consists of a set of activities starting with research and development green

and end with green recycling. These activities will be explained as follows :-

a) Green Innovation Research and Development:-

Green training and development is defined as a set of activities that give a great deal of attention to developing employee skills and improving knowledge that provides them with work methods that reduce waste, proper use of resources and energy conservation (Bangwal &Tiwari,2015:48).If the green research and development is the center of innovative activity in the economic unit and works to bring green to products by introducing technology that makes global warming at the lowest levels and increases the efficiency of activities (Fei et. al, 2020: 7). It also gives an opportunity to engage employees to contribute to solving environmental problems and motivate them to come up with ideas that increase green innovations , It can be said that the scope of green research and development lies in the search for green technology to



reduce emissions, pollution and energy consumption, and to enhance competitive advantage, through creating new green products, improving existing green products, or providing environmental training for workers in the economic unit and transferring the required skills and knowledge regarding greening. To increase environmental awareness by spreading green best practices(Hansen,2007:1).

b) Green Innovation Design

Green design is considered one of the basic activities of the green value chain, and it seeks to reduce the environmental impact of the product during its life cycle, and that thinking in the green direction in design can distinguish the environmental image of the product and the organization, and the goal of green design is to provide or develop current products in a safe and environmentally friendly way (Al-Gharabawi,et.al,2021:35).

Both (Hassan,2019:42) (Muhammad,2021:252) agree that green research and development and green design represent value re-engineering of green products to ensure that the production process in all its activities is green. For example, internal research and development and counterproductive knowledge sources have positive direct effects on both product and process innovation as well as positive integration effects on the activities of other knowledge sources.

c) Green Innovation Manufacturing

Many scientists have studied the drivers of green innovation and believe that green innovation is more affected by government regulation, market attraction, and technological motivation (Sastoque et al, 2019:4). This requires the establishment of new advanced manufacturing industries that focus on the level of technological readiness, indicated by(Blühdorn et al, 2019:3) indicated that the scope of the economic unit is positively associated with innovation in product integration, and that the strategic market objective has a significant impact on green product innovation (Brunnermeier et al., 2003:280) that environmental management tools have a significant positive impact on green product innovation after conducting An interview with product managers in Germany Studies also show that there is a link between the costs of pollution prevention and green innovation in the United States, and it is believed that high pollution levels lead to strict environmental policies, which in turn stimulate green innovation, and thus customer satisfaction is significantly positively associated with product innovation In terms of market attraction, it was found that green process innovation has a positive impact on green product innovation by analyzing the data content

of 209 listed companies in the food industry. Highly polluting manufacturing, and both green process innovation and green product innovation can improve financial performance (Sastoque Pinilla, 2019:3). Green manufacturing can be defined as the process of creating a product that has innovative environmental characteristics that are free from emissions and any harmful pollutants from the moment the raw materials are used until the final product is produced, and this will help increase customer satisfaction as a result of producing innovative products.

d) Green Innovation Marketing

After the product is produced and put on the market, it must meet the needs of consumers, once the needs of consumers change, the uncertainty in marketing will increase (Assis, et al, 2018:250) so the consumer's desire for green products can generate a potential consumer market and become an opportunity Good for the manufacturing industry to invest in green innovation Therefore, having a high degree of existing marketing channels is an important way to achieve success in the marketing of new products. The commercialization of green technology means that advanced technology can be realized in products and put on the market for international trade. Only in this way can the success of green innovation be reflected. In global trade, green barriers and green competition are considered means of protecting international trade (Sun, et al, 2020:9).Through this, innovative green marketing can be defined as the integration of new green technology marketing methods and techniques, which differ from previous methods, as they involve Significant changes in product promotion, design, packaging and green positioning. All of this helps in improving a product or service and reaching a wider audience, and thus will contribute to increasing the market share of the economic unit and customer satisfaction.

e) Green Innovation distribution

Green distribution can be defined (one of the important activities of the green value chain that contributes to adding value to green products through reducing energy use and reducing pollution through the activities of transporting finished products by means of transportation that are not harmful to the environment and choosing distribution outlets(Muhammad,2021:255) that are environmentally and healthily safe. As for innovative distribution, the researcher believes that it must By introducing advanced technology in all stages of the innovative value chain, including distribution, and that this technological progress will transform traditional distribution into a green distribution, especially after the



emergence of the Corona pandemic, which caused the closure of all retail stores. Electronic retail stores have appeared, through which the consumer can order the product without the need. To go to retail stores, and this works to reduce time and rationalize costs, as well as customer satisfaction through ordering the product at any time and place, meaning that the product will be from the factory to the consumer directly.

f) Green Innovation service

Service innovation is defined as “a new service concept or service that has been significantly improved and can for example be a new customer interaction channel, distribution system, technological concept or a combination thereof. Service innovation always includes repeatable elements and service innovation is a service product or A service process based on a technique or a systematic method. However, in services, innovation is not necessarily associated with novelty in the technology itself but innovation often lies in non-technological fields (B.van Ark,2003:5) and thus it can be said that innovative green services are a group One of the activities carried out by the producer to enable the customer to achieve the greatest benefit from products and services while preserving the environment and reducing waste and energy consumption(Cocca & Ganz: 2015, 181).

g) Green Innovation Recycle or disposal

Recycling can be defined as all the means that enable the economic unit to use industrial waste and benefit from it in other work without any impact on humans and the environment and reduce environmental pollution. (Hasan et al, 2019:18) **The researcher believes that the importance of innovation in recycling is considered an economic resource, through which a new product will be reproduced or a product modified instead of being destroyed, and the environment bears the burden of pollution and that this thing will increase the imports of the economic unit, Thus increasing the market share of the economic unit as well as increasing the confidence of customers in the manufactured product.**

2.9 The effect of applying the innovative green value chain on the rationalization of costs and the economic unit

Through analyzing the activities of the innovative green value chain, economic units seek to add value to the products and services they provide, as they show a map of activities that add value to be enhanced, and then other activities that cause consumption of energy and

materials and do not add value to products are excluded(Al-Gharabawi,et.al,2021:35), while ensuring a minimum from pollution and that all of this will rationalize costs , as well as the close link between what the green value chain offers in terms of raising the efficiency of resource and energy use, rationalizing costs and reducing pollution, and enhancing the competitive advantage to ensure that economic units remain in the market for the longest possible period(Muhammad,2021:258-277), and this in turn helps to produce Innovative products, according to what has been pre-planned through green trends by the administration(Morgan, J., 2010), and increasing the awareness of working individuals through practices that create an environmental culture, and that these green innovations start from the first stage (research and development) and end with the last stage (recycling) of activities green value chain (Olson, Erik L,2014:20).

DATA ANALYSIS

Assessment of PLS-SEM Path Model Results

In this section, the second level of analysis is conducted which includes the hypothesis analysis.

H: GIVCh has a significant impact on CR

Research framework



1. Assessing the Measurement Model (Outer Model Testing)

The reliability and measurements consistency can be examined using factor loading or composite reliability to test and confirm factors consistency. in order for the

• **Composite Reliability (CR)**

Hair, Sarstedt, Hopkins, & Kuppelwieser (2014) variable value to be considered confirmative and indicators reflect the latent variable construct, the CR value should be greater than 0.70.

item	CR
GIVCh	0.907
CR	0.918

• **Factor Loading (Outer Loading)**

According to Hair,etal (2014), factor loading "Reflects the level to which the items of the same construct are consistent with each other"the favorable factor loading



value ought to be equal to the typical value of 0.70 or more

item	FL
GIVCh 1	0.908
GIVCh 2	0.732
GIVCh 3	0.882
GIVCh 4	0.870
CR 1	0.904
CR 2	0.894
CR 3	0.881
CR 4	0.878

• **Average Variance Extracted (AVE)**

According to Hair et al. (2010), the AVE is "A statistical assessment that measures the average percentage of the variance extracted commonly amongst the observed variables" The prescribed standard estimation of AVE should be more than 0.50.

item	AVE
RCA-ERP	0.786
CR	0.791

2. Structural Model Assessments (Inner Model Testing)

Several tests need to be carried out in order to assess the significance of hypothesized relationships and the predictive power of the proposed model in the inner model, the tests include Predictive Relevance (Q²), Coefficient of Determination (R²)

• **The Coefficient of Determination (R²)**

The R² value signifies that one or more exogenous variables can clarify the variance percentage in the endogenous variable(s) (Fernandez, 2012). Chin (1998) characterized the R² values into four groups

Level	Value
High	0.67 and more
Moderate	0.33 – 0.66
Weak	0.19 – 0.33
Unacceptable	0 – 0.18

The CR in this research is presented in the table below:-

item	R ²	Result
CR	0.656	Moderate

• **Predictive Relevance (Q²)**

the Q² criterion attempts to measure how well an endogenous construct's can be reconstructed depending on the model and its estimates. According to Bagozzi (1994), if the value excess zero (Q² > 0) show

predictive relevance, while, a value of Q² under zero implies that the model deficit predictive relevance

item	Q ²	Result
CR	0.452	Q ² > 0 Explanatory variable provides predictive relevance

CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

- 1- The use of the innovative green value chain reduces emissions, reduces waste generated, improves product quality, increases work efficiency, conserves raw materials and energy, and increases the utilization rates of those materials, in order to reuse them more than once, which achieves optimal use of resources.
- 2- The application of the green value chain will exclude and eliminate non-value-adding - activities that represent a burden on the economic unit and enhance value-adding activities, and this will be reflected directly and positively on costs.
- 3- The application of the innovative green value chain in economic units requires equipment and devices that reduce chemical emissions and air pollutants, which have a negative impact on human resources inside and outside the unit.

3.2 Recommendations

- 1- We recommend the need to implement the innovative green value chain, by introducing all workers to training and qualifying courses to familiarize them with the latest scientific and technological developments in the field of work and to spread the green culture that contributes to improving the quality of products.
- 2- The need to implement the innovative green value chain, because it will eliminate all non-value-adding activities at all stages of the chain, and this will be reflected in the costs and thus will rationalize them.
- 3- Great attention should be given to research and development activity and to give it the utmost importance in the innovative aspect of equipment and devices, and any details that enhance the environmental aspect and reduce emissions and environmental pollutants, as well as green design activity, and that both activities are considered the main key to applying the innovative green value chain, and therefore the application of this It will rationalize costs by fading the costs of environmental fines.

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