



**COMMUNITIES OF PRACTICE AND QFD METHOD FOR GREEN LOGISTICS IN THE COSMETICS INDUSTRY: A SUGGESTED REVIEW**

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**ABSTRACT**

The Cosmetics, Personal Hygiene and Perfumery industry has significant importance in Brazil and seeks to adopt concepts and technologies of sustainable development to generate competitive advantages that can be achieved by companies in the industry. In this context, this research proposes to identify the perception of sustainability in recycling, mainly plastic packaging, and to suggest the use of Green Logistics and Cradle-to-Cradle concepts and the use of Communities of Practice. The research has a qualitative nature, using the methodology of multiple case studies with several companies in the industry, the data collection was performed through interviews with semi-structured questionnaire and documentary analyzes. The results were the identification of the companies' perceptions regarding sustainability and a suggestion of the application of the QFD method in the systematic unfolding between the needs of the consumer and the quality characteristics of the product that can be applied in these cooperatives to determine, with the presentation of their aspects and the generation of a quality matrix with the requirements raised.



**Keywords:** Communities of Practice; Quality Function Deployment; Green Logistics; C2C

## 1. INTRODUCTION

According to the Brazilian Association of Personal Hygiene and Perfumery Industry (ABIHPEC), Brazil is the third-largest consumer market in beauty products worldwide, behind only China and the United States. Since 2015 a law number 12.305/10 regulates Brazilian's National Solid Waste Policy (PNRS) and sector agreements are made by a type of production chain and integrated solid waste management plans adhering to the reality of each municipality (BRASIL, 2016). The city of São Paulo, the biggest in the country, provides fiscal incentives also for the Cosmetics, Personal Hygiene and Perfumer Industry (HPPC) that should incorporate shared responsibility and will be required to implement reverse logistics in their operations to predict their business models the entire product lifecycle and Cradle-to-Cradle (C2C) concepts.

Green Logistics deals with the reduction or non-generation of waste from the cradle to the cradle and incorporates the concept of shared responsibility for correct disposal of waste, to encompass all links in the production chain, government, and society, attending the goals and sustainable development (MCDONOUGH; BRAUNGART, 2002; OECD, 2013). Communities of Practice (CoP) consist of groups that meet periodically around a common interest to develop applicable learning (WENGER, 2002) and presents different levels of participation that can contribute to the systematic unfolding of the relations between desires of consumer and characteristics of product, which is supported by the QFD method to the conversion of consumer requirements into product quality characteristics (AKAO, 1990).

This article has the objective of identify preliminarily the current status of interest of the Brazilian industries of the HPPC sector in the implementation of the Green Logistics and to suggest the use of the Quality Function Deployment (QFD) method in Communities of Practice, to facilitate the survey of consumer requirements according to with legislation, that would make it possible to reduce costs and generate knowledge assets for innovation in the development of products and their packaging.

Some aspects are relevant in this research:

- **Market.** The cosmetics market in Brazil has grown significantly in the last 17 years due to factors such as the inclusion of class C in the labor market, greater participation of women, an increase in life expectancy, price improvement, among others. These companies continue to grow and seek to adopt concepts and technologies of sustainable

development to generate competitive advantage (NUNES; GLÓRIA JÚNIOR, 2016; SANTOS, MONTANHERI; GLÓRIA JÚNIOR, 2017).

- **Sustainability.** Green Logistics concepts are approved and included in the sector agreement for the packaging area and should be adopted by companies in the HPPC sector, encompassing a set of actions, responsibilities, and means that should enable the collection and restitution of solid waste for reuse, both in the production cycle itself and in news cycles, to allow both the final disposal, reuse or recycling of the packaging and become an instrument of economic and social development that needs to include consumers in the process (MCDONOUGH; BRAUNGART, 2002; OECD, 2013).
- **Novelly.** Communities of Practice (CoP) refer to collaborative tools and interactive environment that help members to expand skills and share knowledge to support business, create responsibilities and generate new products, processes, and solutions that can be driven by combined use of QFD that consists in the conversion of consumer requirements into product quality characteristics through systematic unfolding (AKAO, 1990; WENGER, 2002).

## 2. THEORETICAL BACKGROUND

### 2.1. Communities of Practice

Production chain or supply chain must incorporate quality in its operations and observe in an integrated way involving the whole product cycle, since development, obtaining of raw materials and inputs, production process, to consumption and the final disposition, thus generating innovation according to principles of development sustainable (COSTA NETO; CANUTO, 2010).

Reverse logistics is now a PNRS requirement and aims to reduce waste from its origin to its consumption, reusing all possible materials, increasing the product's life cycle. This concept of logistics modified the way of seeing the development of products including contrary movement towards the direct flow in the supply chain, which allows reduces waste and recovery of discarded materials, or its respective return to the market (ROGERS; TIBBEN-LEMBKE, 1998).

If the return of goods to the production process reduces environmental impacts or brings ecological benefits, this activity complies with the principles of Green Logistics and sustainable development. Green Logistics involves both direct and reverses flows, as both can generate

impacts on the environment, and are concerned with impacts caused and its environmental aspects (DONATO, 2008).

Communities of Practice (CoP) differ from other types of associations, teams, and workgroups, project and task forces because people engage in this kind of group through affinities identified with a common and a long-term purpose and is used to designate informal groups that have common identity whose essence makes intensive use of knowledge to promote learning from practical applications forming a network that brings together solutions and responses to organizations (WENGER, 2002).

## **2.2. Quality Function Deployment**

Quality Function Deployment (QFD) is a specific method for listening to customers, discovering their real desires through a logical system to determine how best to meet those needs with existing resources, to meet the overall quality of the product obtained through a network of relationships. The QFD can be conceptualized as a methodical way of communicating systematically the quality-related information and explaining the related work to obtain quality and aims to achieve the focus of quality assurance during product development (CHENG; MELO FILHO, 2007; DONATO, 2008).

The QFD method is a system based on input and output matrices that allow transforming the desires of customers into the design, process service and product requirements (COSTA NETO; CANUTO, 2010).

The QFD can also be conceptualized as a tool to systematically communicate in an orderly way what information indicates the related work to reach the desired quality and aims to reach the quality assurance focus during the development and is subdivided into Quality Deployment (QD) and Quality Deployment in the restricted (QFDr) sense (CHENG; MELO FILHO, 2007).

The concept the Quality Deployment (QD) as the process that seeks to translate and transmit customer requirements into product quality characteristics through systematic unfolding, starting with the determination the Voice of the Customer, passing through the establishment of functions, mechanisms, components, processes, raw materials and extending to the establishment of process control parameter values (CHENG; MELO FILHO, 2007; COSTA NETO; CANUTO, 2010).

They also define the QFDr as Work Function Deployment or, simply, Work Deployment. The purpose of QFDr is to accurately specify what functions or human work are required to achieve product and company quality that meets customer needs.

QFDr contributes to the preparation of two important documents of the Quality Assurance System of the Company: the Quality Assurance System Diagram (DSGQ) and the Quality Assurance Activity Table (TAGQ).

Although QFD is a recognized methodology to increase customer satisfaction in products and services based on understanding their needs and to improve the design of services that meet or exceed their expectations, it should be considered some limitations are presented in the method and show in their studies that QFD can also be combined with other methodologies and tools in a complementary way, to require flexibility and thus to attend different situations, not limited to one type of solution (SILVA; SOUZA, 2017). This flexibility is demonstrated through the incorporation of other tools that bring the possibility of adapting the answers to the specific problems and in line with the wishes of those involved.

The selection of auxiliary technique to QFD to obtain the most appropriate Voice of the Customer depends on the desired information and available budget. Qualitative techniques are the most appropriate at this stage, as they allow the generation of ideas and the deepening of the user's point of view about the product. The main goal is to produce a list of needs that be as wide as possible, with the mind free of preconceived ideas, seeking to learn, simply listening and observing the clients (CHENG; MELO FILHO, 2007).

### **2.3. Cosmetics, Personal Hygiene, and Perfumer Industry**

The term Cosmetic is associated with some element used in the application of the face or other parts of the body to change the appearance and raise the beauty of a person, such as hygiene and cleaning products (MOTA et al., 2014) and corresponds to a part of the sector.

The Cosmetics, Personal Hygiene and Perfumer Industry (HPPC) is a union of three sectors: (1) Personal Hygiene, they are product of external use, being able to be antiseptic or not, destined to salubrity or the corporal disinfection; (2) Perfumer, product or aromatic composition based on natural or synthetic substances, which have concentration and appropriate vehicles, has as main function odorizer people or environments; (3) Cosmetics, are products of external use destined to the protection or the embellishment of all the parts of the body (ABIHPEC, 2017).



The industries must obey the rules imposed by the National Health Surveillance Agency (ANVISA) so that they can exercise their activities, as criteria of good manufacturing practices as a way to guarantee the sanitary quality of their products, and thus ensure the satisfaction of their customers (ANVISA, 2015).

The ANVISA determines that manufacturing processes must be clearly defined, systematically reviewed, and show that they are capable of manufacturing products within the required quality standards, for example, the manufacturing areas must be equipped with the necessary infrastructure to carry out the activities; the company's infrastructure should facilitate the cleaning and maintenance of the equipment; every procedure, regardless of whether it is cleaned, maintained or manufactured, must be documented and passed on to its employees in the specific areas of each activity; and analyzes must be carried out on the raw materials, as well as they must be fully identified, including the name of their suppliers (ANVISA, 2015).

### 3. METHODOLOGY

The present study showed in Table 1, is of a qualitative nature (GIL, 2007) and uses the Multiple Case Study methodology (YIN, 2015). Data collection was done through semi-structured interviews (MARTINS; THEÓPHILO, 2009). The analysis unit is the quality procedures of the companies studied (GIL, 2007).

Table 1: Method characteristics.

Items	Values	Authos
Nature	Quality	Gil (2007)
Methodology	Multiple case Studies	Yin (2015)
Collected	Interviews	Martins and Theóphilo (2009)
Analysis Unit	Quality procedures	Gil (2007)

Source: Authors

The methodological procedures (Figure 1) were:

- **Step 1: Selection of Companies and Respondents.** The selection of companies and respondents was due to the accessibility by authors in the universe of this kind of factories at the capital of the State of São Paulo, the main engine of the Brazilian economy, that accounts for almost 1/3 of the country's GDP (32.2%), something larger than countries such as Portugal, Finland, and Hong Kong.
- **Step 2: Interviews.** Eight interviews were carried out in 5 relevant companies in the HPPC sector in the city of São Paulo from 11/2016 to 12/2016;

- **Step 3: Information Analysis.** The information was analyzed to identify the positioning of the companies concerning the development of products according to the premises of Green Logistics.
- **Step 4: Applying Techniques.** CoP and QFD techniques were compared to form a format that could be applied sequentially.
- **Step 5: Presentation of the Results Obtained.** The data analyzed were presented according to the directions identified.

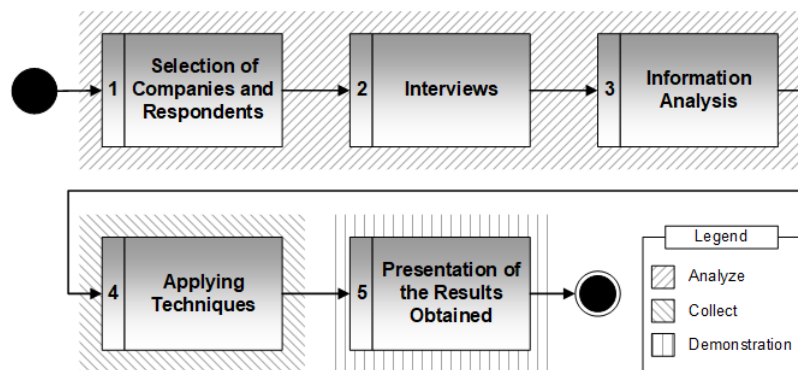


Figure 1: Methodological Procedures  
 Source: The Authors.

### 3.1. Propositions

This article has two propositions.

- **Proposition 1: Brazilian companies in the HPPC sector contemplate the development of packaging products according to the Green Logistics premises.** Companies should listen to the needs of consumers (ARMSTRONG, ADAM, DENIZE; KOTLER, 2014). Companies in the HPPC are directly influenced by consumers who are aware of the needs of Ecology and are requirements of PNRS (ABC-COSMÉTICO, 2017).
- **Proposition 2: Organizations can benefit from the combined use of CoP with QFD methods to measure consumer needs according to Green Logistics premises.** The QFD is a method of converting consumer requirements into product quality characteristics for project quality enhancement to finished product through the systematic unfolding of the relationships between consumer requirements and product characteristics that can be used in the CoP to solve the problem of Green Logistics deployment (ROGERS; TIBBEN-LEMBKE, 1998; AKAO, 1990; WENGER, 2002; CHENG; MELO FILHO, 2007).

### 3.2. Object of study

The companies chosen according to Table 2 were selected based on their relevance in the HPPC sector.

- **Enterprise A (Ent-A).** Has over 20 years of existence with about 100 employees and two factories, one in the southeast region and another in the northeast region of the country, stand with more than 40 products and it is a leader in the segment with headquarters in the city of São Paulo.
- **Enterprise B (Ent-B).** Has a well-defined position in the HPPC sector, has more than 200 employees and only one plant in the city of São Paulo has been growing in the market for more than 30 years.
- **Enterprise C (Ent-C).** It is the winner of several awards such as Top of Mind, one of the market leaders with more than 25 years of existence, 150 employees and headquarters in the state of São Paulo.

Table 2: Summary description of the companies.

Enterprise	Location	Time of operation	Main characteristic remarks
Ent-A	São Paulo 2 Factory In the Southeast and Northeast	> 20 years	More than 40 products and is the leader in the HPPC segment of the type of product it produces. Around 100 employees
Ent-B	São Paulo	> 30 years	Acts as a producer of other small companies. Approximately 200 employees
Ent-C	São Paulo	> 25 years	Products for the treatment of the face and hair. Winner of several awards. More than 150 employees
Ent-D	2 Factory plants in São Paulo	> 20 years	International presence. Use of nanotechnology. More than 500 employees
Ent-E	São Paulo	> 30 years	Valuation of employees and clients. Export of products. More than 60 employees

Source: Authors

- **Enterprise D (Ent-D).** Has more than 500 employees, has been in the market for more than 20 years and has an international presence; as well as a factory in São Paulo and it is associated with the use of nanotechnology.
- **Enterprise E (Ent-E).** Has 60 employees, more than thirty years of existence, prizes for the valorization of employees and customers and exports most of its products from It headquarter in São Paulo.



### 3.3. Respondents Profile

Respondents according to Table 3 are people who work in HPPC companies and have decision positions related to the management of production or the impacts that it may have.

Table 3: Respondents profile.

#	Enterprise	Position Held
R1	Ent-A	Strategic Decision Maker
R2	Ent-B	Production Decisor
R3	Ent-C	Production Decisor
R4	Ent-C	Company Image Decisor
R5	Ent-D	Team Decision
R6	Ent-D	Production Decisor
R7	Ent-E	Strategic Decision Maker
R8	Ent-E	Production Decisor
R9	Ent-E	The decision of Quality of Production

Source: Authors

## 4. RESULTS AND DISCUSSION

Table 4 shows the compilation of the responses obtained on the development of products and their packaging according to the Green Logistics assumptions presented in three groups: (1) Are not interested in recycling, (2) Have some interest, (3) Does not consider part of the process.

Table 4: Industry Positioning on Green Logistics Requirements

Enterprise	Positioning	Comments
Ent-A	No	There is no interest
Ent-B	No	It is not an actual company positioning
Ent-C	Delayed	Due to crisis, the project was postponed
Ent-D	No	There is no interest
Ent-E	Sensitive issue	The company is aware of consumer demand

Source: Authors

### 4.1. Research with Enterprises

Some of the answers must be highlighted like as founded in the first group labeled "No", the R1 (Ent-A), who stated that "...It is not interested in recycling packaging...", in the same way at Ent-D with R5 stated: "...We do not care about this...", supported by R6. Incredibly, a company considered a leader in the sector has not concerned about this issue. The same way, the R2 (Ent-B) states that it who are not worried about recycling and says that "...recycling of packaging should not be a concern of our customers because we only deliver what they ask for...".

In the second group labeled "Delayed", among Ent-C respondents, that appear to be concerned and mentioned that R3: "...they have already thought of doing so, but due to the crisis that was introduced in the country they postponed...", response supported too by R4.

In the third group labeled "Sensitive Issue", represented by the R7 and R8 both from Ent-E who mentioned that "...We are realizing that consumers appreciate this type of action and we were looking into the possibility of having a recycling system, but it is costly for the company...". Similarly, R9 (Ent-E) mentioned "... the actions are reactive according to the pressure of ANVISA...".

#### **4.2. Use of QFD in Communities of Practice**

The levels of participation in the CoP include clients, sponsors, outsiders, lurkers, experts, leaders, supports and beginners which can be considered as customer requirements in the QFD matrix for generating technical characteristics of products. The voice of the customer (VOC) will be obtained from the results of the community of practice (CoP) created among the members of the cosmetics chain. The use of QFD will allow the prioritization of the actions to be developed, considering the endogenous and exogenous factors. The combination of CoP + QFD will serve as a matrix to conduct a more accurate survey of consumer needs at various levels as shown in Figure 2.

#### **4.3. Analysis of Propositions**

- **Proposition 1:** Brazilian companies in the HPPC sector plate the development of packaging products according to the Green Logistics premises.

Answer: **No.** The companies surveyed did not include packaging recycling activities and Green Logistics assumptions in their strategies. Only two companies, Ent-C and Ent-E, cited a low degree of involvement with the topic.

- **Proposition 2:** Organizations can benefit from the combined use of CoP with QFD methods to measure consumer needs according to Green Logistics premises.

Answer: **Yes.** The CoP can use them QFD method to assist in surveying customer needs and thereby foster knowledge and develop products and solutions that incorporate Green Logistics concepts. The combined use makes it possible to better manage the knowledge produced in the cosmetic supply chain and also prioritize the actions in front of the clients' needs. It will also allow the discovery of latent needs in consumers that

may not be clear to the companies interviewed. It will contribute to the strengthening of the supply chain of cosmetic packaging.

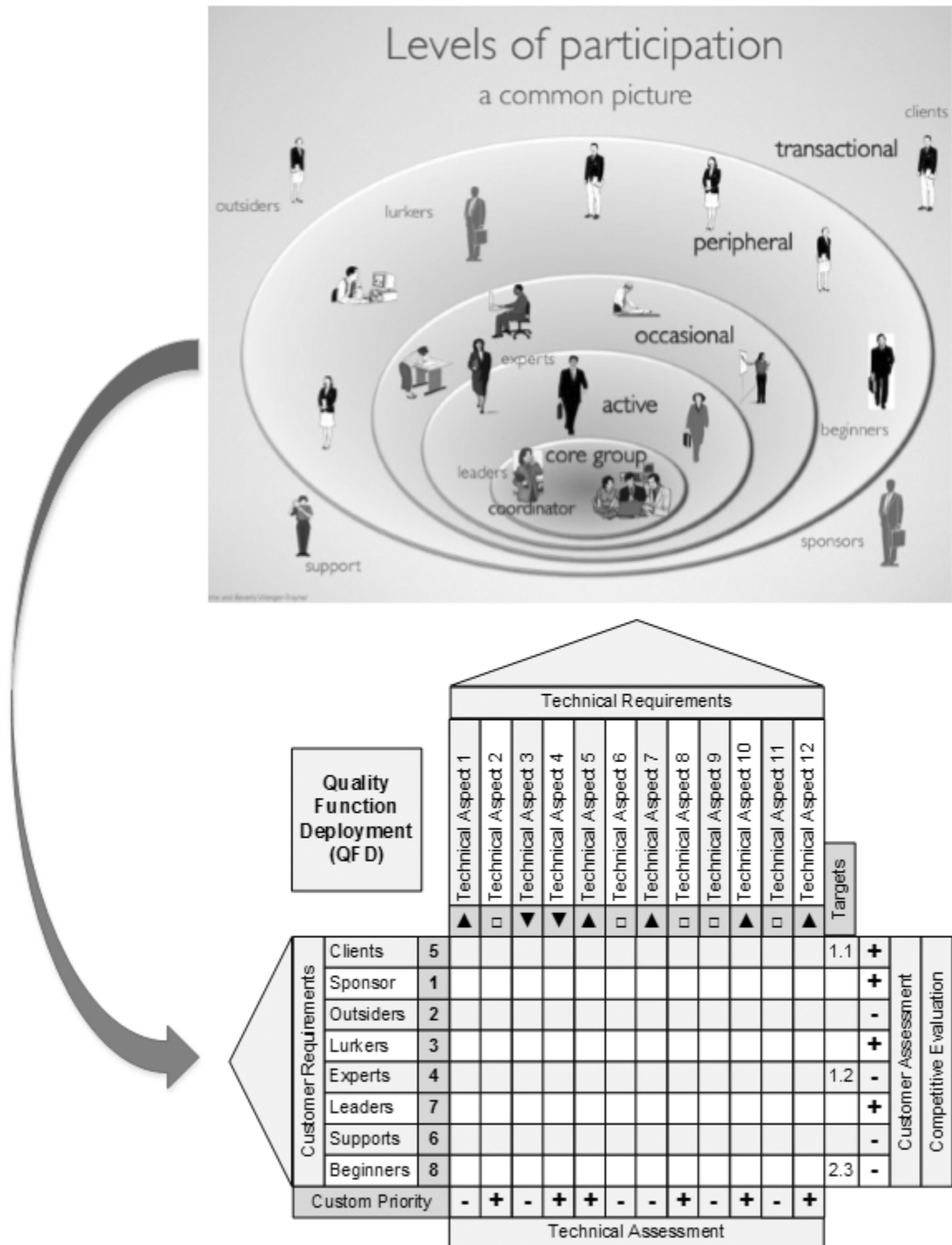


Figure 2. Use of the QFD method according to levels of participation in the CoP  
 Source: Adapted from WENGER (2002) and CHENG (2007).

#### **4.4. Discussion**

The research presents, among other information, that companies in the HPPC sector have little or no motivation to carry out the recycling of products, even with research demonstrating the financial return (MONTANHERI; GLÓRIA JÚNIOR, 2019), which is a contradiction for a sector that claims to be concerned about the environment and consumer satisfaction (ABIHPEC, 2017).

The suggestion of combining CoP and the QFD method is possible, but due to the inertial positioning of companies in adopting forms of recycling, managers may encounter several obstacles when trying to implement the concepts presented in this research.

#### **5. CONCLUSIONS**

This article presented the vision and current status of interest of five Brazilian HPPC in the implementation of Green Logistics for their packaging and suggested a proposal for the combined use of the QFD method in Communities of Practice to facilitate the collection of Green Logistics requirements outlined in the PNRS which deals with shared responsibility for solid waste management and considers that each part must comply with the motto of non-generation, reduction, reuse, recycling, adequate final disposal of wastes and treatment of solid waste.

About HPPC companies investigated, the findings were as follows: they are increasing process and should use Green Logistics due to their strategic potential for creating competitive and sustainable advantages and the research showed this current status of product development: (1) Are not interested in recycling, (2) Have some interest; and (3) Do not consider it as part of the process.

About the proposal of the combined use of CoP and QFD tools to assist in the implementation of Green Logistics, the findings were: it is possible to infer that the use of the combined techniques can help to obtain a systematic way the desires of the consumers for the requirements of development of products and thus broaden organizational horizons and generate benefits such as the exploitation of economies of scale, cost improvements and competitiveness differentials through the CoP and their respective levels of participation of its members that has a mission, or common problem to be solved.

The limitations of the work area in the scope of research, which, despite all production processes generate waste, investigates only the packaging, another point is in the analyzed scenario of established companies in the city of São Paulo, responsible for 32% of the country's GDP.

Regarding future research and studies, it would be interesting to cross-check the manufacturers' and distributor's production status with consumer expectations and PNRS requirements, which could lead to reformulations and innovations at a production that could incorporate the Cradle-to-Cradle concept.

Another interesting work is the full application of the QFD method for the construction of indicators of a quality matrix in Communities of Practice.

Uses of QFD in Communities of Practice presents itself as an adequate instrument for this type of collaborative environment that propagates knowledge by systematically surveying requirements for consumer issues, and this can increase the generation of benefits such as profitability, new processes, and innovations applicable to the development of products, according to Green Logistics.

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