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## Article

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## Logistic Contribution from the Vision of the Technical Services in the Hotel Industry

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### Abstract:

**Purpose:** The objective of this article is based on the identification, from the theoretical and empirical order with the application of multivariate statistics, of the essential variables that intervene in the technical services processes of the hotel industry and with it the conformation of a theoretical model for the management of said process.

**Design/methodology/approach:** The designed methodology, used for the processing of the research, consists of three phases of development that allow the selection of the variables that from the theoretical order coexist in the consulted literature, which in an integral way are subjected to an analysis of experts to confirm its existence in the practical object of study. Subsequently, the design of the evaluation methods of the selected variables is carried out, culminating with the analysis of relationships and influences between variables, all of the above under the multivariate statistics approach.

**Findings:** The main results of this research are achieved after the systematic application of the designed methodology, observing the existence of three essential perspectives that affect the management of technical services in hotel industries, and that include 35 variables corroborated from multivariate statistics. This allowed the elaboration of a theoretical model for the management of this process, contributing from the logistic approach with the integration of this subsystem as part of the business management of the hotel sector.

**Originality/value:** The originality of this material lies in the experimental identification of the main limitations explicit and (or) implicit in contemporary theory, to address the process of technical services in the hotel industry. Based on the contributions made as part of this research, we can identify the incidental variables in this process, as well as their grouping into three perspectives, resulting from the above in the possibility of illustrating the performance of this process from the theoretical model proposed.

**Keywords:** Logistic, technical services, hotel industry, environmental perspective, social perspective, technological perspective.

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## 1. Introduction

In recent years, the hotel industry worldwide has had a sustained development. In Cuba, the development of tourism has manifested itself in a particular way, driven by the exceptional conditions of the 90s, when the government was forced to look for alternatives for the survival of the country.

International tourism grew rapidly and became one of the fundamental engines of the Cuban economy for its contributions to the Gross Domestic Product (GDP). It is considered to be the most dynamic sector, with revenues of over two billion dollars, substantially influencing the social, economic, cultural and technological metamorphosis that has occurred in Cuban society (Pérez-Loaiza & Estrada-Muñoz, 2018; Quintana-Rodríguez et al., 2005; Martínez-Vivar, Sánchez-Rodríguez, Pérez-Campdesuñer & García-Vidal, 2018).

To achieve these results, the accommodation capacity grew considerably to reach more than 50,000 rooms in 2018, a figure that will be increased with the construction of 10,000 housing capacities. The tourist modality of greater flows in the world is that of sun and beach; in Cuba, its behavior is similar, with 69% of current capacities being assigned to it. In this development strategy occupies an important place the Holguin destination, third in the country, with 6,440 rooms operated by three hotel groups, more than 70% with category 4 and 5 stars. The tourism boom promoted large hotels, in Cuba they represent 57% of the total. Some hotel complexes with capacities close to a thousand rooms are, for example: Playa Pesquero Hotel with 944 rooms and the Meliá Las Dunas in the keys of the north of Villa Clara with 925 rooms.

The sun and beach hotels, in search of minimizing negative impacts to the environment have been inserted into the environment, offering constructions in horizontal modules that occupy a larger area, especially increasing the technical networks in their extension and capacity of work. To this is added its commercialization in the all-inclusive modality, which is characterized, among other aspects, by offering services that occupy large spaces, both by capacity and by the variety thereof, while increasing the number of equipment and systems necessary to guarantee this offer (Reyes, Álvarez, Martínez & Guamán, 2018; Periyasamy, Ramamoorthy, Rwawiire & Zhao, 2018).

The hotel companies, according to Maté-Jiménez, Fernández and Campos (2001), they must be able to adapt to the transformations of the environment, defining strategies that allow them to improve their competitiveness and achieve qualitatively and quantitatively optimal occupation levels. These strategies should be aimed at achieving, in the words of several relevant authors in the field of tourism research (Campo-Ruiz, 2006, Quintana-Rodríguez et al., 2005), a sustainable competitive advantage based on cooperation and integration business. These criteria are reaffirmed if one considers that to provide tourism services, large amounts of energy and water are consumed, generating considerable volumes of solid and liquid waste, which reveals its high impact on sustainability. For example, a hotel with more than 300 rooms consumes some 4,000 MWh and 115,000 m<sup>3</sup> of water per year, generating around 5,000 m<sup>3</sup> of solid waste.

For its management, the hotel relies mainly on the Technical Services area (TS), which includes, for the purposes of this research: management of the technological perspective (life cycle of fixed assets); environmental perspective (energy, water, waste and others); and the social perspective (interpersonal relationships). This makes this area a center of attention to maintain the attractions that motivate the trip: beach, image and customer satisfaction, achieving this satisfaction from the management of attributes such as comfort, pool service, etc.; as well as its contribution in the realization of other services and activities.

Despite the importance of energy sources, water, waste and other actions related to the environment within the management of the TS in the hotel, in the literature consulted the vision of the TS focuses on the maintenance process, which is still an important element.

In the literature consulted, the component elements of TS in hotels are treated independently from different perspectives: Cabrera-Gorrín, Borroto-Nordelo, Monteagudo-Yanes, Pérez-Tello and Campbell-Ramírez (2004), Landa-García (2005) and Montero-Laurencio (2007) focus on the consumption of energy carriers, Denis-Fernández and Sánchez-Ávila (2005) on water distribution, López-Moreda, Reyes-Leal, Ruiz-Castell and Pérez-Falcón (2007) on solid waste management, Ybáñez-García, Sánchez-Ávila and Rodríguez-Nogueira (2004) discuss

the contribution of maintenance to the improvement of the environment, Niyamosoth and Pathumnakul (2018) to hotel maintenance, Márquez-Ortiz, Cuétara-Sánchez and Frías-Jiménez (2006) to sustainability, among other authors.

This analysis allows us to conclude that the components of the TS are studied independently, and there is no evidence, at least explicitly, of a methodological treatment with an integrating view of these issues. Of the component elements of the TS, maintenance is the subject most treated in the literature, mostly in the context of other industries and with scarce references to services, particularly to hoteliers.

The insufficiencies in the management of the TS, have caused a significant deterioration of the hotel facilities evidenced, among other factors, by the occurrence of a high number of unforeseen incidents (reaching averages of more than 900 unforeseen incidents per month in the studied hotels). ), the large volume of capital replenishments and repairs that must be made due to the urgent need to introduce improvements to maintain or increase the competitiveness levels of the hotel, from a sustainable perspective (Torres-Rodríguez & Batista-Rodríguez, 2004).

From the foregoing, it is concluded that in their performance, the TS have not reached the expected levels, manifesting mainly in the levels of deterioration of the hotel plant, insufficient use of energy carriers, water and the still existing opportunities to reduce the environmental impact.

However, it must be taken into consideration that the improvement of the TS performance is a complex problem, which must be addressed in a comprehensive manner, from perspectives that consider the factors, actors involved in it and the environmental trends. The lack of this approach and the insufficiencies that are manifested in the management of the TS in sun and beach hotels, allow defining the existence of a research problem, which will be addressed as part of the present investigation.

## **2. Theoretical Analysis**

In the literature consulted, limitations can be observed when explicitly identifying the existence of management models for TS in hotels. In any case, its closest theoretical concept is focused on maintenance, and there are also few references to maintenance issues in services and especially in hotels. However, in topics related to the management of the TS in hotels, technologies were found that are generally based on continuous improvement and the latest trends in business management that can serve as a basis for the management of the TS in sun and beach hotels.

For the analysis, seven models were taken into account: Nakajima (1991), total productive maintenance based on the principles of total quality; De la Paz-Martínez (1996), alternative maintenance applied to the textile industry; Periyasamy et al. (2018), integral productive maintenance supported by the integration of various management tools, applied to Varadero hotels; Batista-Rodríguez (2000), contributions to maintenance in Cuban sugar mills; ISO 14 000 (2004), standards for corporate environmental management; Borroto-Pentón (2005), contributions to maintenance in Cuban hospitals, which reflect current trends in environmental management and maintenance, which due to their proximity to the object of research, generality and representativeness of different industries were taken into consideration.

Sixteen variables were analyzed: sustainable vision, maintenance, energy, personnel, integration, continuous improvement, diagnosis, customer satisfaction, participation, information system, policies, investments, process approach, water, waste and life cycle of fixed assets.

The variables analyzed, in general, present common points that distinguish the role of personnel and their participation in management, the integration of approaches, policies and other elements, continuous improvement, diagnosis, and the importance of the information system.

Its fundamental limitations, for the purposes of this research, are related to the lack of a sustainable vision; most do not use the process approach, do not consider customer satisfaction as one of the fundamental outputs, they focus only on a specific activity of those that make up the TS, and although they recognize the role of the staff, they do not express how to do it.

In recent years, several investigations have been developed framed in tourism management from different perspectives and different levels of analysis. Thus, for example, with references at the destination level, Valls-Figueroa (2006), which develops a technology for the evaluation, analysis and diagnosis of quality in the sun and beach destinations. This research does not discuss in depth, the impact on the image of the destination, the environmental management and infrastructure in its technical support, an aspect highly valued by customers. Despite the complexity of the subject, the quality of the destination is closely linked to these qualities. In this technology only the technical state of the technological equipment is evaluated without including other relevant physical attributes such as decoration and the technical condition of the installations in general.

Framed in hotel management, several studies have also been carried out from different disciplines, among which are those developed by Leyva-Rodríguez (2003) with a technology for logistics management, an important link in hotel management due to its dynamics and variety of assortments. However, only products, materials and supplies are included and services provided by third parties, which have a high incidence in the management of the TS and one of the areas with the greatest deficiencies in the Cuban hotel context, are not included.

Negrín-Sosa (2003), introduces an improvement in the management of operations in hotel service companies with a process approach that is closer to the TS, but without delving into the particularities that characterize it for what its treatment is insufficient.

Conde-Pérez (2003) presents a technology to develop the market orientation of hotels with application in Sancti Spiritus, based on satisfaction (orientation) to the client. In spite of proposing the orientation to the market based on the tourist product, its analysis and adaptation, the research does not assess physical attributes of the hotel, which, according to Aryee (2011), constitute the basis of customer satisfaction in a hotel: comfort and image. This author agrees with the appreciation of Conde-Pérez (2003) that the orientation to the market is not, essentially, to sell the hotel but to adapt to the needs of the client. Therefore, these pass through the attributes related to technology, care and conservation of the environment, aspects that are not explicitly addressed.

The process approach, as a tool to improve the administration of resources, increase the added value by increasing the competitive level of the hotel, is addressed by Vázquez-Santiesteban (2005). This shows the results of the process map application, where it can be seen that TS are only linked to corrective maintenance, included in a first level process called assurance, which also includes warehouses and purchases. This vision, in the opinion of the authors, makes the management of the TS considerably more difficult with an integrating approach, thus demonstrating the traditional vision focused on maintenance.

Espino-Rodríguez and Gil-Padilla (2005), in his research develops a technology for the strategic and tactical management of quality in a hotel of sun and beach. This shows a better approach to the TS; however, still with a vision closer to maintenance. The process approach and the consideration of the operational dynamics of these facilities constitute, in the opinion of the authors, two of the aspects of interest for the management of the TS in sun and beach hotels, addressed in this research.

One of the most studied areas in the hotel industry in recent years in Cuba has been the management of human resources. An example of this can be seen in Abrate and Viglia (2016), which deals with the strategic management of human resources in small tourism companies; Nieves and Quintana (2018), the improvement of human resources in the tourism sector; Al-Refaie (2015), proposes a comprehensive technology for the management of human resources training in hotel facilities; Chan, Okumus and Chan (2018), with the internal audit of human resources in small and medium-sized Cuban hotel companies; and De Miguel Guzmán, Pérez-Campdesuñer, Sánchez-Rodríguez, García-Vidal and Martínez-Vivar (2018), a technology for the planning of human resources in hotel facilities.

In general, the perception of the TS that is appreciated is the maintenance and are not taken into account in the different perspectives of the management of human resources that analyze the particular characteristics, no longer of the TS, but of the maintenance in the facilities hotels. However, to have deepened in other hotel processes such as accommodation, food and beverages, there are no known recent studies that concentrate their major efforts in this process.

A deeper perspective than the previous ones is found in Jiang, Wang and Cheng (2018), highlighting the crucial role played by the TS in the assurance of the quality of a product offered to the guests, being one of the most important parcels within the organizational scheme of a hotel establishment. The complexity and variety of the tasks that demand at a certain moment, the correct operation of the installation and the maintenance of the standards, implies to properly distribute the work between the own staff and the service providers to hire, where a high level of polyvalence especially in the own personnel. Reference is made to the necessary relationships established to achieve their objectives, however, methods or tools to achieve them are not provided.

In summary, in the studies conducted in the hotel management in Cuba, regarding the process of the TS, its scope is limited and the vision of this is focused on maintenance. No evidence of systematically conducted studies of the management of TS (or maintenance) in sun and beach hotels was found. However, from the study of these technologies it can be concluded that they are based on the improvement approach, there are common points that support any methodological proposal in the management of the TS in sun and beach hotels. Among those that are: its cyclical nature, demand the active participation of staff with an emphasis on leadership and commitment, go through the effect-cause-solution path, presenting the diagnosis as a defining stage, and culminate with the validation of solutions and the formation of new methods and levels achieved.

### 3. Methodology

Based on the deficiencies found during the literature review, regarding the characteristics of the approaches consulted related to TS and as a means that contributes to the organization for the development of this research, the phases described below were structured (Figure 1).

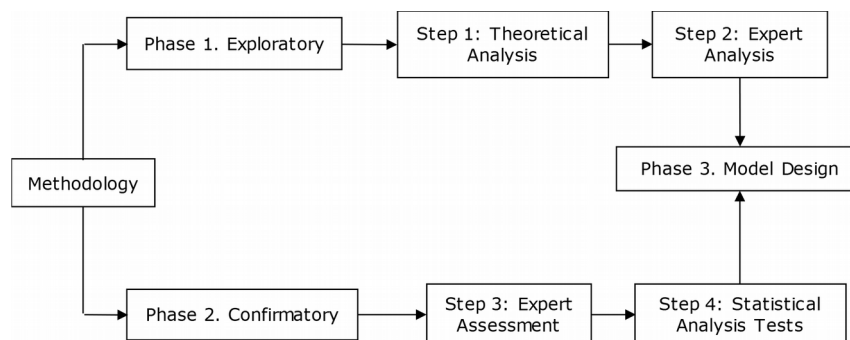


Figure 1. Methodology for the identification of essential variables

#### 3.1. Phase 1: Exploratory

Objective: Identify from the theoretical order, the variables that are related in the consulted bibliography that affect the technical services in the hotel industry.

Step 1. Theoretical analysis. For the development of this step it will be necessary to take again, from the theoretical analyzes addressed in the previous section, those variables linked to the TS that are explicitly addressed by the authors consulted as a consequence of the theoretical studies carried out.

Step 2. Expert Analysis. With the aim of reducing the list of variables identified from the theoretical point of view, an expert assessment is carried out using the Delphi method. The experts include both academics and entrepreneurs, who, based on their opinions in the different rounds that are carried out, will allow the selection of those variables most influential in the TS, of the selected study object, verifying that there is a strong agreement between the opinions issued by the selected experts.

#### 3.2. Phase 2: Confirmatory

Objective: Confirm, with the application of statistical tools, the importance of the selected variables and the relationships between them.



Step 3. Expert Assessment. The development of this step includes the design of the instruments to evaluate the variables identified as most influential for the TS. The designed instruments must be subjected to the analysis of their reliability and apparent validity and content. Likewise, we proceed to the selection of those experts who contribute with the valuations required to issue the weights of each of the variables analyzed.

Step 4. Statistical analysis tests. As a result of the previous analysis, the ordering of the variables obtained is required according to the degree of importance, and the data matrices are finalized for processing using the statistical package SPSS for Windows (version 15.0, 2006). Using the analysis of main components.

### 3.3. Phase 3. Model design

Objective: Graphically design the model, which considers the interactions of the essential variables resulting from the confirmatory phase.

For the design of the model, it is necessary, based on the factorial analysis developed, to graphically order the variables obtained by each quadrant, making it possible to demonstrate the relationship between them from the theoretical and empirical order, resulting from the statistical analyzes developed.

## 4. Results

### 4.1. Phase 1: Exploratory

In this phase, the conditions for the practical development of the research were prepared, achieving the selection of the work team, the training and the communication of the actions to be developed to the areas involved.

For the identification of the variables linked to the TS (see Table 1), a panel of experts familiar with the subject was formed, in order to obtain their opinions on the participating variables extracted from the theoretical analysis, establishing the existence of a strong concordance in the results.

Variables	Perspectives		
	Social	Technological	Environmental
Customers	0.742	-0.008	0.051
Organizational culture	0.647	-0.011	-0.003
Organizational structure	0.944	-0.037	-0.053
Degree of participation in the solutions	0.957	-0.040	-0.070
Interdepartmental relations	0.955	-0.051	-0.050
Hotel management	0.945	-0.056	-0.017
Suppliers of products and services	0.917	-0.049	-0.019
Governments	0.931	0.104	0.031
Hotel chains	0.927	0.098	0.032
Water consumption	-0.054	0.097	0.977
Water quality	-0.059	0.100	0.677
Sewage treatment	-0.062	0.101	0.941
Distribution networks	-0.058	0.100	0.957
Plans and culture of water saving	-0.007	-0.022	0.955
Handling of dangerous substances	-0.036	0.095	0.945
Gardening and decoration	0.007	0.050	0.917
Environmental policies	0.012	0.054	0.931
Management of solid and liquid waste	-0.016	0.045	0.927
Characteristics of final consumers	-0.017	0.013	0.742

Variables	Perspectives		
	Social	Technological	Environmental
Plans and culture of energy saving	0.006	0.024	0.647
Degree of automation of energy control	-0.043	-0.014	0.944
Years of exploitation	-0.025	0.923	0.781
Type of technology	-0.028	0.843	0.810
Degree of automation	0.025	0.900	0.787
Maintainability	-0.026	0.869	0.769
Policies and Maintenance Systems	-0.034	0.975	0.039
Material assurance	-0.070	0.718	0.021
Loading capacity	-0.059	0.735	0.095
Complexity of the equipment	0.042	0.681	-0.020
Type of technology installed	-0.041	0.958	0.055
Operating expenses	-0.056	0.923	0.031
Energy and functional efficiency	-0.002	0.843	0.054
Replacement policies	-0.023	0.900	0.065
Costs	-0.070	0.869	0.001
Assurance - Hiring services - Energy sources	0.023	0.894	0.003

Table 1. Results of the correlation between the variables and the axes of the factorial analysis of correspondences for the TS process

#### 4.2. Phase 2. Confirmatory

Subsequently, the ordering of the variables obtained was required according to the degree of importance, and the data matrices were finalized for processing using the statistical package IBM SPSS Statistics (version 21, 2015). The analysis of main components was used (Table 1 and 2), where in the first three components it is possible to explain 77.68% of the total variance, a highly positive aspect.

- The first perspective, which integrates all the variables that reflect actions to report the failures detected from any functional area of the hotel, resulting in communication between the areas and TS, for what was called "social perspective" (interpersonal relationships). This perspective explains most of the total variability (33.37%).
- The second, which is called "technological perspective", is divided into two groups: one that contrasts the variables related to the number of customers, their satisfaction and the execution of maintenance plans, explains 31.69% of the total variability; and the other, the energy consumption with the maintenance plan performance, explains 6.66% of the total variability.
- The third perspective groups the environmental factors of temperature, relative humidity and environmental waste with the energy and water consumption per occupied room (HDO), fuel consumption and conventional fuel costs in tons (FCC), for which it was designated as "environmental perspective". This explains 12.62% of the total variability.



Reliability Analysis: Cronbach's Alpha Coefficient: 0.893			
Validity Analysis: Kaiser- Meyer- Olkin Coefficient: 0.885 Bartlett's Sphericity Test: 15504.807 Significance: 0			
Study of the variables			
	Axis I (Social)	Axis II (Technological)	Axis III (Environmental)
Own values	7.8	5.8	5.4
Contribution to the total variance	33.37%	31.69%	12.62%
Accumulated percentage of variance explained	33.37%	65.06%	77.68%

Table 2. Results of the factorial analysis of correspondences for the TS process

#### 4.2. Phase 3. Design of the Model

The general objective of the model is the graphic representation of the theoretical conception, which serves as a support to achieve the integration of the essential dimensions that characterize the management of the TS in sun and beach hotels, favoring their understanding, performance and, as a consequence, its contribution to efficiency, customer satisfaction and ensuring sustainable competitive advantages over time with the consequent economic and social benefit, as well as the reduction of negative environmental impacts.

The theoretical model is conceived as a synthesized representation of the TS in sun and beach hotels and their essential perspectives, in their interrelation with the external and internal environment. The model serves as a guide in the establishment of a general procedure and its specific procedures for its management through the phases that comprise it, through a set of established and technically based tools. Its practical application guarantees its effectiveness and adaptation to the context and is based on the following principles:

**Participatory nature:** the application of technology implies the active participation of all levels of management and workers in all its stages, and this principle is essential in the execution of actions.

**Process approach:** TS is assumed as one of the processes that contributes to customer satisfaction, both internally and externally.

**Parsimony:** the very structuring of technology, its logical consistency and flexibility allow to carry out a complex process in a relatively simple way.

**Relevance:** for the quality of the final results of the application of the general technology, according to the needs of its customers.

**Generality:** for the possibility of its extension as a methodological tool in other organizations.

The theoretical-practical analyzes carried out to date create the basis for the proposal of the model shown in Figure 2. This is based on the criterion that the management of the TS in sun and beach hotels is based on the interaction between their three essential perspectives: the technological, the environmental and the social, and which at the same time interrelate with the environment; with a systemic and continuous character, where each one of the elements that are closest to the graphic border of the model condition or influence those that are in a central position or inside.

The inputs to the process of managing the TS are the objectives of the organization (derived from management by objectives or another similar approach), which presuppose the necessary elements that guarantee the transformations of the process.

This is based on the integration of its three essential perspectives: environmental, technological and social, with a participatory and sustainable approach that guarantees positive results in the fulfillment of the objectives: customer satisfaction, availability and costs. The use of technology for the provision of hotel services, while reducing environmental impacts, is only achieved if relations are adequately managed, both internally and externally, to meet

the needs of customers, achieving high availability of the technological infrastructure, comfort and image at reasonable costs in a given context.

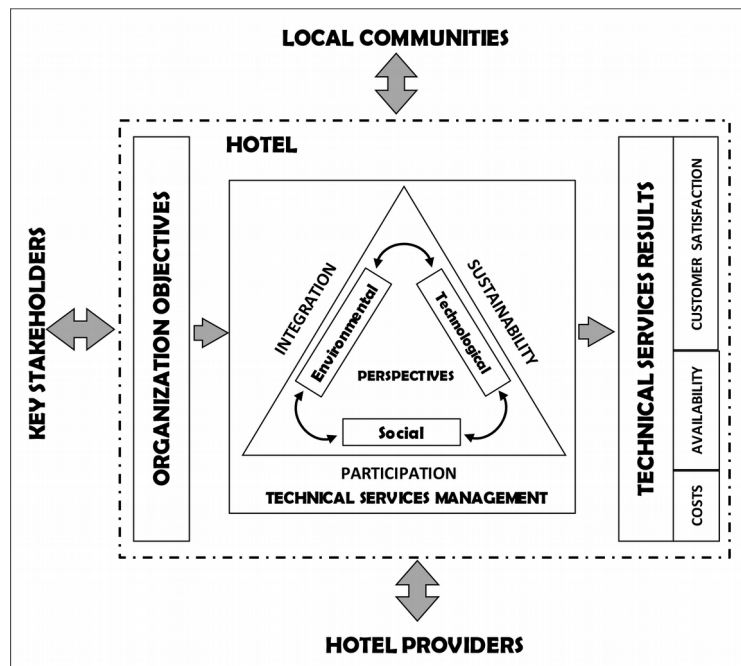


Figure 2. Theoretical model of the Technical Services management in sun and beach hotels

The external environment to the hotel is conditioned by three large groups:

Local communities that provide personnel, customs, cultural and natural heritage, while receiving the benefits of economic welfare, training, employment and an improvement of local infrastructure associated with the development of hotel accommodation. These are factors that characterize the interactions between local communities and the hotel system.

- Influence groups, made up of government institutions, hotel groups and wholesale travel agencies that regulate and control the development of hotel management, defining the framework for their performance, in accordance with the governmental interests derived from them, interests of local communities, the country, hotel groups and tour operators.
- Hotel providers of services and consumer goods necessary in the development of hotel processes. The growing demands of all types of service, consumer goods and materials demand from the market better and more varied offers. However, the increase in prices and the lack of offers, in the Cuban case, negatively influence the results of the management of the TS in sun and beach hotels.

The effectiveness of the management of the TS in sun and beach hotels, is based on the integration of its three essential perspectives: the good state of the technological perspective allows to achieve higher levels of customer satisfaction, together with high energy yields and savings of water, minimizing the environmental impacts of gas emission, waste of natural resources and others.

The conceptual model proposed for the management of the TS in sun and beach hotels, in correspondence with the previously expressed, summarizes its main characteristics in the following:

- The need for an integrating vision of the essential perspectives of the management of the TS to achieve better results. The technology used and its technical status are relevant to achieve the rational use of energy resources and water, while minimizing environmental impacts. However, it is not possible if the best interpersonal relationships in the management process are not achieved.

- Management paradigms are presented as essential elements in the result of environmental influences, the most important being: sustainability, process, participative management, innovation and outsourcing approaches as ways to obtain competitive advantages. Under these paradigms the technology is designed and the actions aimed at raising the results of the management of the TS in sun and beach hotels are applied.
- The definition of the management principles of the TS in hotels of sun and beach, guarantees the necessary interdependence and the systemic character that should prevail in any technology obtained from it, the flexibility that makes possible in the face of unforeseen events, correct the deviations produced with respect to the planned actions, and finally, the economy, by virtue of which all technology must be directed towards a favorable cost-benefit relation.
- The proposed model is aimed at promoting the most rational use of resources and especially environmental management and technology, based on their integration in terms of customer satisfaction and the results of the organization.

## 5. Conclusions

In its practical behavior, in the TS management in sun and beach hotels, three perspectives were identified that distinguish it: an environmental perspective, related to energy, water, waste and others; a technological perspective that manages the life cycle of fixed assets (equipment, technological systems and facilities); and a social perspective, which manages the interpersonal relationships that are established in its development. This conception was corroborated in the empirical analyzes carried out in the hotels under study and represents a better approach to the practice in the hotel industry and a better understanding.

The conceptual model developed in the framework of this research proved to be a methodological solution to the scientific problem posed, as it allows to characterize and intervene, through a general procedure derived from it, in the TS process in sun and beach hotels, Based on a systemic approach, based on the best business practices, it strengthens the available resources in order to achieve high levels of efficiency in the TS management.

The essential characteristics of the general procedure, derived from the theoretical model, are: with respect to its integrating nature, which harmonizes the elements inside and outside the process, especially its essential perspectives; its cyclical nature, associated to the fact that on each cycle of analysis carried out the following one is developed, on qualitatively different and superior bases; and its flexibility, give it advantages for its adaptation to the context of application favoring its generalization to other hotels.

## Declaration of Conflicting Interests

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