Innovation of Touristic Products in Resort Hotels, a Procedure Based on Complex Adaptative SystemsE

Innovación de productos turísticos en instalaciones hoteleras. Un procedimiento desde los sistemas adaptativos complejos

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ABSTRACT

Aim: To design an innovating procedure of touristic products using a complex adaptative system approach to generate new and improved products.

Methods: Theoretical methods, such as the historical-logical, analysis and synthesis, and induction-deduction methods were used. Empirical methods like interview, observation, and survey were used as well. Team work was the technique used, through parallel learning structures or teams, whose role facilitated training, learning, and innovation. Besides, intelligent computerized techniques were used, particularly association rules, and Markov chains, to generate innovation sequences.

Main results: A procedure relying on complex adaptative systems was designed, which can generate adaptative characteristics that modify and adapt innovation sequencing to resort hotels, based on the SAC-InnoTour software designed for this purpose. Implementation at Melia Cayo Coco Resort Hotel permitted to develop new or improved

products, and to identify the competitive advantages that contributed to customer differentiation and satisfaction.

Conclusions: The procedure works as a complex adaptative system, since it generates adaptative characteristics that modify the structure, which was observed in the innovation sequence produced with the software. The implementation of this procedure at the chosen resort hotel, corroborated its practical validity, based on pertinence and the fulfillment of the work objectives set.

Key words: innovation; touristic product; complex adaptative systems.

RESUMEN

Objetivo: Diseñar un procedimiento de innovación de productos turísticos desde un enfoque de sistemas adaptativos complejos para la generación de nuevos y mejorados productos.

Métodos: Se utilizaron métodos teóricos como el histórico-lógico, el análisis-síntesis y la inducción-deducción; métodos empíricos como la entrevista, la observación y la encuesta. Se empleó la técnica de trabajo en grupo mediante estructuras paralelas de aprendizaje o equipos, cuyo funcionamiento facilitó la capacitación, el aprendizaje y la innovación. Además se usaron técnicas de inteligencia computacional, específicamente reglas de asociación y cadenas de Markov para generar secuencias de innovación.

Principales resultados: Se diseñó un procedimiento que, basado en los sistemas adaptativos complejos, genera características adaptativas que modifican y adecuan la secuencia de la innovación a la instalación hotelera, apoyado en el software SAC-InnoTour elaborado para estos fines. Su aplicación en el Hotel Meliá Cayo Coco permitió desarrollar nuevos o mejorados productos, así como identificar ventajas competitivas que contribuyeron a la diferenciación y satisfacción de los clientes en el hotel.

Conclusiones: El procedimiento funciona como un sistema adaptativo complejo porque genera características adaptativas que modifican su estructura, lo cual se evidenció en la secuencia de innovación generada con el software. La aplicación del procedimiento en el hotel seleccionado, corroboró su validez práctica a partir de su pertinencia y el cumplimiento de los objetivos de trabajo planeados.

Palabras clave: innovación; producto turístico; sistemas adaptativos complejos.

INTRODUCTION

Since the beginning of tourism, there have been countless examples of innovation in this sector or other areas, which have brought significant influence (Brooker & Joppe, 2014; Hjalager, 2015; Mullo, Castro, and Guillén, 2019). Particularly, in the hotel sector, innovation has gained more relevance, and its pertinence has been corroborated to meet the redirection of the demand, and to create increasingly novel products that can be adapted to the needs of customers, and the capacities of resort hotels. Likewise, their usefulness has been proven in the implementation of organizational strategies, efficient use of tangible resources of companies, and touristic competitiveness, though this case is mostly associated to IT or technological innovation utilization.

The contributions made by Schumpeter (1934) —known as the creator of the theory of innovation—, along with the emergence of scientific research and technological development (R+D), besides the momentum gained by technological innovation in the 1980s, are the foundations of touristic innovation.

Studies of touristic innovation, and particularly of touristic product innovation, have increased in recent years (Delgado, Vargas, Montes & Rodríguez, 2016; Hjalager, 2010; Yumisaca, Mendoza, and Benavides, 2019), putting this issue among the main research lines within tourism, together with destination competitiveness, and sustainable development (Delgado *et al.,* 2016; Osorio, 2016). However, when considering the most widely known studies (Amponsah & Adams 2016; Delgado *et al*., 2016; Dornan & Moufakkir, 2015; Hjalager, 2010, 2015; Ivars, Vera, and Acebal, 2014; Yumisaca *et al.,* 2019), common shortages are observed to limit the continuous character of innovation, adaptability to various scenarios, and conception as an integrated activity whose order and intensity change according to the needs and capacities of the practical context.

Follow up and review of several trends in tourism found in Hosteltur (2016, 2019), World Tourism Organization (WTO, 2016, 2019), and ThinkTur (2019), evidence the need to develop product innovation. Hence, innovation is a source of competitiveness in resort hotels (Ruizalba, Vallespín, and Pérez, 2015), by generating and renovating competitive advantages through a regular flow of novel and improved products, which requires the use of novel tools that facilitate constant renovation of product attributes.

These assertions show the need of new approaches, based on complex adaptative systems, which, from a more integrated, less centered on a linear process, and predominant perspective prevailing so far, consider the evolution and adaptability of touristic product innovation. According to Holland (1992) and Gell (1994, 1995), complex adaptative systems are formed by system interdependent and integrated components, which have the capacity of evolving. From their interaction, adaptative and survival strategies emerge (Stacey, 1996), together with the ability of components to evolve. In the case of touristic product innovation, besides from the existence of components that give place to novel and improved products, it is important to generate a sequence of innovation activities that suit a particular resort hotel, thus guaranteeing the generation of adaptative behaviors (Carballo, Yera, Carballo, and Betancourt, 2019).

This research focuses on the design of a procedure for touristic product innovation based on a complex adaptative system approach for the generation of novel and improved products in resort hotels, which contribute to new competitive advantages, and higher customer satisfaction. This paper is structured as follows: first, it deals with the rationale for touristic product innovation in resort hotels, and its operation as a complex adaptative system. Secondly, it focuses on the methodology used, and the structure of the procedure suggested. Thirdly, the main results from implementation in sun and sand destination Meliá Cayo Coco Hotel, in Jardines del Rey.

DEVELOPMENT

Touristic product innovation in resort hotels

The literature includes several concepts of product innovation that have extended to the hotel sector, which demonstrate the pertinence and need of this practice (Hall & Williams, 2008; Hjalager, 2010, 2015; Pikkemaat, 2008).

According to Hjalager (2010), touristic product innovation refers to changes observed directly by customers, which are regarded as novel, because were never seen, or new to the company or a particular destination. This concept confers special attention to the perceptible quality of changes or product improvements, but it is important to know that customers perceive these changes as a set of benefits that meet their needs. Therefore, it is important to identify customer needs first, and then design a real product, and think of the ways of expanding it in the resort hotel, based on the capacities and resources available.

The usefulness of touristic product innovation is dealt with in the literature in relation to the importance for the generation of competitive advantages (Nigel, 2016), since it facilitates the design of novel products or improvements to already existing ones, contributing to the development of specific products, from completely standardized to customized ones for diversifying and specializing the offer (Martínez and Vargas, 2013).

The competitive advantages ensure the superiority of a resort hotel in the market, and enables competition not only through price, but in terms of other elements like service quality, customer profile, resource availability, and staff training. Nevertheless, the most important aspect is the capacity of the resort hotel is to link and integrate factors that can hardly be imitated by their competitors, which mobilized, can produced competitive advantages through a continuous and adaptative process of novel and improved touristic products.

The literature identifies five main generations of models or innovation proposals: linear, stage models, interactive or mix, integrated, and network models (Velasco and Zamanillo, 2008; Carballo *et al.,* 2016, 2019; Carballo, 2017). In these cases, there is a remarkable similarity between the procedures established for product design or development (Delgado *et al.,* 2016; Tristá, Castellanos, Gómez, Berenguer, and Hernández, 2009). The most significant variations are related to the moment in which cost-effectiveness and marketing mix studies are conducted, which must be done, depending on the needs and

capacities of the hotel, when touristic product innovation is required, without a particular arrangement.

Generally, one of the most common flaws in these studies is their limited adaptation to different implementation scenarios, determined by a rigid and static arrangement of steps, where co-evolution between components is poorly considered. Likewise, there are components that cause the emergence of poorly dealt with indicators, properties, and characteristics. In this case, for instance, the life cycle of product resort hotels can generate adaptative behaviors depending on the phase it is. It causes changes or alter the order of steps of innovation, so it is necessary to consider the effects on the structure of a given innovation procedure (Carballo *et al.,* 2019).

Moreover, most authors whose contributions are compiled in Tristá *et al.* (2009), Delgado *et al.* (2016), and Yumisaca *et al.,* (2019), place the generation of ideas as the first step in innovation. However, this research study advocates for wider knowledge of the elements that constitute sources of ideas, before generation, to obtain more pertinent and viable criteria, according to the capacities of the resort hotel and its surrounding.

Product development must be implemented through tools that help make decisions under uncertainty, such as available scientific advances, cooperation networks, and transference of solutions applied in other sectors. Another element to consider for product development is the utilization of tools that enable the selection of their requirements. In that sense, authors recommend adapting *Quality Function Deployment* from Akao (1988), though implementation in tourism has not been frequent (Das & Mukherjee, 2008), particularly within technological innovation.

The essential variables of touristic knowledge defined by Campodónico and Chalar (2011), such as time, space, touristic motivations and activities, —integrated by the author in the TOPIC analysis—, are helpful in touristic product innovation, because they refer to the touristic season; the particular space used for innovation; customer motivations; and innovation-related activities.

Essentially, the analysis of touristic product innovation in resort hotels must consider the interaction of different factors, and their adaptation to the particular conditions of each scenario. This approach goes beyond systemic perspective, and assumes that components evolve among themselves, and are inter-defined for the generation of

competitive advantages with the novel and improved products. Accordingly, there is a need to tackle this topic from a complex adaptative system approach.

Touristic product innovation and operation as a complex adaptative system

Complex adaptative systems (CAS) are presented as a theoretical perspective in which a broad number of proposals are explained. Holland (1992), Gell (1994, 1995), Stacey (1995,1996), Anderson (1999), and Mitleton (2005).

A review of the literature resulted in the lack of consensus to group CAS (Bohórquez, 2013; Gell 1994); however, some affinity has been observed among various characteristics suggested by Stacey (1995), Kauffman (1995), Anderson (1999), and Mitleton (2005), which are based on the definitions made by Holland (1992), and can be grouped in three categories: emergence, self-organizing, and coevolution.

Self-organizing consists in structural changes in the new organization, depending on agent interactions; emergence is permanent appearance of novelties derived from such interactions. Coevolution refers to changes and transformations presented, as an element influences and is influenced by the others.

The type of innovation to develop, the life cycle phase of a product, and the generation of knowledge and innovating ideas by a work team can be described as emerging characteristics of a resort hotel. Concerning the life cycle of a product, for example, if a resort hotel is in the introduction phase, some extra expenses are made in research + development + innovation (R+D+i), so the economic context should be known in advance to determine cost-effectiveness of R+D+i, generating an adaptative change in touristic product innovation.

These characteristics of the hotel resort seen through emergence, self-organizing, and coevolution, lead to structure variations in innovation product components to adapt to internal or external changes; that is, due to outdated technology conditions, life cycle evolution, or redirection of the demand.

In this case, the utilization of intelligent computing techniques, such as Markov chains, and association rules is important, since they facilitate the incorporation of available knowledge, and lessen the limitations of other techniques, like neural networks, and genetic algorithms. (Ghoshal and Sarkar, 2014) is if α then β, where α and β are two sets of disjunct items. Another commonly used way to express an association rule is α => β.

Set α is named after its predecessor or rule antecedent, whereas β is the successor or consequent. Furthermore, a Markov chain or model (Puterman, 1994) is made of a set of Di, and the transition probability matrix *(P(di|dj))* between states, whatsoever *di* and *dj*. Then, the probability of development for a particular sequence (*dn, dn-1, dn-2,…, d2, d1*) is given by: $P(d_n, d_{n-1}, d_{n-2}..., d_2, d_1) = P(d_n) * P(d_{n-1} | d_n) * P(d_{n-2} | d_{n-1}) * ... * P(d_1 | d_2)$

Markov models ensure direct transition modeling between the development of components, considering a possible weighted transition, and allowing for modeling of the sequential nature of possible routines to develop. Association rules guarantee modeling of the relation between characteristics and components. This technique indicates the user transparently and intuitively implementation of certain components, depending on the initial characteristics, as opposed to other techniques that fail to show the users a justification for such implementation.

CAS procedure structure and operation

In the procedure proposal, the main components of touristic product innovation identified are contextualized customer profile, innovation opportunities and obstacles, product life cycle, generation of ideas, dynamizing activities of touristic product innovation (closely related to product design and implementation), and pertinence. Besides, the context component is taken into account (International Standard Organization, 2015), which includes various contexts: legal, economic, sociocultural, technological, and market. A number of 15 indicators were defined for these contexts, including the pertinence of innovation policy, R+D+i cost-effectiveness, price variability of similar products in the hotel, training opportunities, and market share.

The procedure is understood as a set of components and activities that, logically related, emerge, self-organize, and coevolve for touristic product innovation. For implementation, resort hotels must comply with the following conditions: customer information to provide satisfaction from novel and improved touristic products; commitment of management and staff to innovation and continuous improvement; constant training of employees engaged, and a minimum operation time.

The procedure is made of three phases, seven components, and 14 activities (Fig. 1). The discontinuous lines represent the relations established with the environment, and

the arrows between phases, components, and activities show the continuity of touristic product innovation through emergence, self-organizing, and coevolution.

During the organizing phase, which comprises activities (A1, A2, A3), a multidisciplinary work team should be made for developing touristic product innovation, defining work objectives, and determining the sequence of product innovation for the resort hotel.

The objectives may be defined according to the desired levels of cost-effectiveness, income or profit, or be oriented to determining market segments, mean stay duration, occupation percent, and index of customer satisfaction.
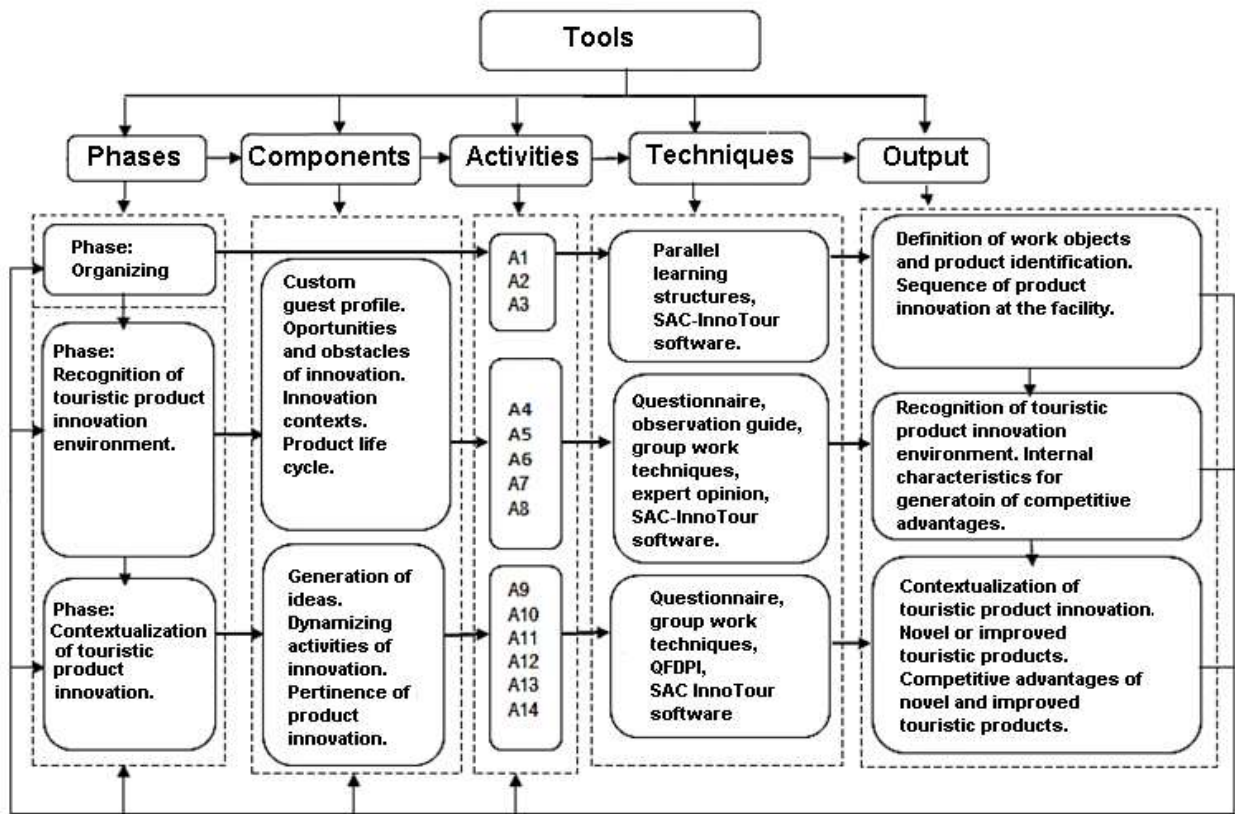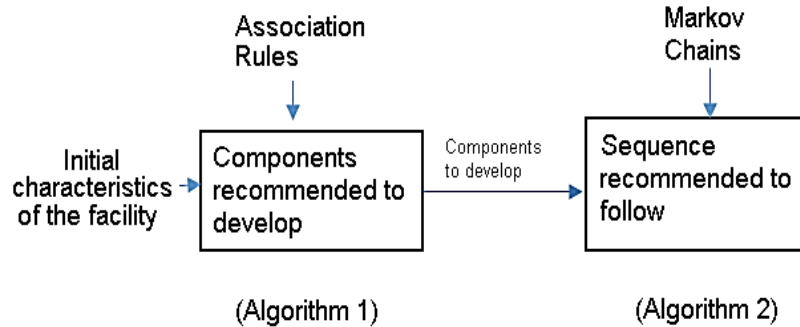
Fig. 1. Synthesis of touristic product innovation procedure

Source: made by the authors

When the work objectives are laid out, product innovation sequencing is determined according to intelligent computing techniques (SIPIC); this particular case required association rules and Markov models (Fig. 2).

Fig. 2. Sequencing method for product innovation based on intelligent computing techniques (SIPIC)

Source: made by the authors

SIPIC is run with the SAC-InnoTour software. The work team inputs the initial characteristics of the resort hotel: life cycle phase in progress, innovation type (novel, improved product, or both); and the existence or not of the cost sheet, with a price pre-set by the hotel chain. The life cycle of a resort hotel must be the first to develop, since this features has a big influence on other components. Through software processing based on predefined association rules, these initial characteristics generate different components and activities of the procedure that must be developed in every resort hotel (Algorithm 1, Fig. 2). Later, using the same software, through a Markov model, the order in which the components and activities take place, is determined (Algorithm 2, Fig. 2).

This sequencing is generated by previously considering all the possible arrangements, until the most probable touristic product innovation sequence is determined. This sequence is the guide for systematization of touristic product innovation, and it is shown to the work team through software interface (Carballo *et al.,* 2019).

The environmental recognition face of touristic product innovation contains four components and five activities (A4, A5, A6, A7, and A8). In the customized profile of the client, some features are gathered, which influence the generation of ideas, identification of requirements and specifications of the novel or improved touristic product, and also support the generation of certain competitive advantages. Activity A4 corresponds to this component, which is the identification and characterization of market shares to which the novel or improved touristic product is directed. It must be done using variables time,

space, motivations, and activities. Starting with the motivations is recommendable, since they modify the other variables most of the times.

Then —depending on the sequence generated for systematization of touristic product innovation—, the corresponding following component or activity is done, and so on.

Component opportunities and obstacles of product innovation, two activities are performed (A5 and A6), which are determination of opportunities and sources of touristic product innovation, and determination of the obstacles to touristic product innovation. The first ones are determined through analysis of customer satisfaction, and innovation objectives perceived by executives and staff. The objectives, along with the sources, and possible obstacles to touristic product innovation, are determined by the survey suggested by Delgado, Edson, and Oliveira (2010). These activities help identify the most influential aspects to generate ideas, and to define the requirements and specifications of the touristic product.

In component context of touristic product innovation, A7 takes place; it is the characterization of the legal, economic, sociocultural, technological, and market contexts involved in product innovation. Upon context characterization, depending on the set indicators, the most influential aspects in the generation of ideas can be identified, apart from learning internal and external characteristics that enable the generation of competitive advantages.

Lastly, the life cycle component of the resort hotel is developed along with activity A8. This behavior is represented by the SAC-InnoTour software, so the work team only has to click on the phase the resort hotel is currently in, as well as the initial features manifested. The software, under the suggested rules, generates the components and associated activities, and arranges them through a Markov model, generating the most probable sequence for touristic product innovation.

The objective of the contextualization phase of touristic product innovation is to implement product innovation. It begins with the generation of ideas for novel and improved products (A9), which is made of idea presentation, risk assessment, and final screening of ideas. Relying on work objectives and coevolution of components and activities of the procedure, the possible ideas are listed for development; they are reviewed, and redundant ideas are removed or combined. The work team qualifies the

importance level of each idea in a 1-3 scale, where 1 is the lowest importance, and 3 the highest. When these values are issued, the relative importance value of each idea is calculated (IIR$_i$), and the ideas with higher than or equal to the mean are chosen:

$$IIRi = \frac{(CAI_i \times 3) + (CIM_i \times 2) + (CBI_i)}{N \times 3}$$

Where: CAI is the amount of high importance qualifications; CIM are mid-important qualifications; CBI, low-important qualifications; and N, the number of work team members.

For risk analysis and final screening of ideas, the risk of the resulting ideas are determined by means of Zabotinsky (2004) screening. Accordingly, the ideas are listed, and through group work, the occurrence probability, and consequently, risks, are qualified. Through multiplication, risk value and classification are obtained (low, moderate, high, and extreme). The ideas whose risks are moderate or low are chosen, though due to the emergence of new needs of innovation, high and extreme ideas can be chosen as well, so the corresponding actions to reduce or eliminate their impacts, can be taken.

After the generation and screening of new ideas, the work team verifies possible correspondence with the objectives defined in A2, of the organizing phase; if necessary, they can be defined. Later, the corresponding component or activity is performed depending on the sequence generated by software SAC-InnoTour. Generally, it is the component of dynamizing activities of innovation, since it allows for breaking down new ideas obtained through requirements and specifications of the novel and/or improved product.

The *Quality Function Deployment for Product Innovation* (QFDPI) matrix, adapted and improved from Akao (1988), is recommended for realization of A10 and A11. Customer requirements (CR) and product specifications (PS) are related in this matrix. CR refer to specific preferences of tourists in the resort hotel where innovation takes place; PS are the attributes or capacities the hotel has to meet such preferences with the novel or improved products. In this case, the technical importance of PS that meet CR are calculated:

$$IT_{EP} = \sum R_{EP,RC} \times P_{RC}$$

IT_{EP} is obtained from the weighted sum of the ratio values between PS and CR ($R_{EP,RC}$),

by using CR importance or weight as a weighting factor (P_{RC}).

In this research, the technical competitive positioning index of product specifications has been added to the QFDPI matrix in relation to direct competence, as a new functionality.

$$IPTC_{EP} = \frac{(CM_{EP} \times 2) + (CI_{EP} \times 1) + (CP_{EP} \times 0)}{CC_{EP} \times 2}$$

Where: CM_{EP}: the amount of better qualifications in the study; CI_{EP}: equal qualifications; CP_{EP}: worse qualifications; and CC_{EP}: the number of competitors.

Direct competition is qualified as better (2), equal (1), or worse (0) than the resort hotel studied. A closer value to 0 of $IPTC_{EP}$ indicates better competitive positioning of PS in a particular resort hotel.

Besides, the calculation of the Spearman correlation coefficient to determine ratios between specifications, was added. This relation was analyzed in terms of strong and weak correlations to meet CR. PS with positive ratios favor touristic product innovation, and can be turned into competitive advantages. Those with negative ratios, generally, hinder them, and make up an improving direction or should be replaced.

Activity A11 is done to determine competitive advantages associated to novel and improved products; the team should consider: a) specification of product with the highest technical importance; b) specification of product with positive correlations of product innovation; c) customer requirements, and specifications of touristic product specifications in the previous requisites, and additionally, have a better behavior than the direct competence.

Activity A12 to determine mix marketing actions of novel and improved touristic products, are the traditional variables, but the novel aspect is their order of execution, which will vary depending on the emergency, self-organizing, and coevolution of different components of the procedure. For instance, if a product specification from specifications determined in activity A10, is related to price, the work team will not have to make this action in activity A12. Therefore, marketing mix variables can be determined at any time of the procedure, if required, which contributes to the systematization of touristic product innovation.

In the evaluation component of product innovation pertinence, A13 is realized, which consists in economic feasibility analysis, and customer satisfaction analysis with the novel and improved touristic products, and A14, analysis of innovation objective fulfillment by the working group.

In A13, product cost-effectiveness is calculated. It is important not to add profits or costs of the improved product to the already existing product. In this case, only the difference should be considered; that is increased profit, and cost differences. If it is an investment project for a novel or improved product, liquidity, cost-effectiveness, and investment risk must be taken into account, including the recovery period, the current net value, and the Internal rate of return. If innovation is focused on social responsibility of the resort hotel, the work team might assume non-profitable products, but with other types of benefits for the hotel.

Analysis of customer satisfaction is performed through existing tools and mechanisms in every hotel, though other methods and techniques adjusted to the particular needs of the facility should also consider customer requirements, and product specifications.

In A14, the fulfillment of work objectives is analyzed, in relation to the results achieved. It is a key activity within the procedure suggested, it can be used to measure the effectiveness in the systematization for the generation of competitive advantages depending on novel and improved touristic products.

Implementation of the procedure at Meliá Cayo Coco Resort Hotel

Meliá Cayo Coco resort hotel is located at Jardines del Rey sun and sand destination, to the north of Ciego de Avila province, in Cuba. It is the fourth important destination in the country, with more than eight thousand hotel rooms. The selection of the hotel in this research study was based on the fact that the hotel meets the premises established in the procedure, as part of one of the most important hotel chains in this destination: Melia International Hotels, one of the chains that has attracted a large number of repeating guests in the last five years (Ministry of Tourism [MINTUR], 2019), which is a fundamental criterion to consider the introduction of novel or improved products in relation to customer perception.

In that sense, to perform the necessary activities, 86 repeating guests were part of the study. The procedure used to determine the size of the sample was probabilistic. As the

population was known (13 143 guests), the formula for finite populations was used, considering an error margin of 10%, and a confidence level of 95%. Moreover, 100% of the Board of Directors (12), and 20 members of the staff, were included. The sample selection was non-probabilistic, through intentional screening, in order to study the opinions of executives and staff directly involved in the innovation product.

In Hotel Meliá Cayo Coco, the work team identified Weddings and Honeymoons as the innovation product. Three work objectives were set, though they were further improved, as every component of the procedure was studied.

The adaptability of the process to meet the work objectives was evidenced in the possibility to have a specific sequence for the hotel, and the ease of returning, and changing the course of product innovation. The sequence of touristic product innovation was generated automatically, using SAC-InnoTour. Accordingly, the work team activated four initial characteristics of the installation: life cycle in the maturity phase. The innovation type containing novel and improved products, preset cost sheet, and price, by Meliá, and no changes in the basic level of the product.

Based on these characteristics, new association rules were activated: 1) To develop the product life cycle; 2) To generate ideas; 3) To design dynamiting activities through the QFDPI matrix; 4) To develop pertinence; 5) If the life cycle is maturity, develop opportunities and obstacles, contextualized profile and contexts in parallel; 6) If it is a novel product, develop distribution and advertising actions within marketing mix; 7) If it is a novel product, develop market share determination; 8) If there is a cost sheet pre-established by the chain, follow the cost determined, and the price set by the chain; and 9) If there are no changes in the basic and tangible level of the product, not to make price changes, and distribution. These rules allowed for the obtainment of the final innovation sequence shown in Fig. 3.
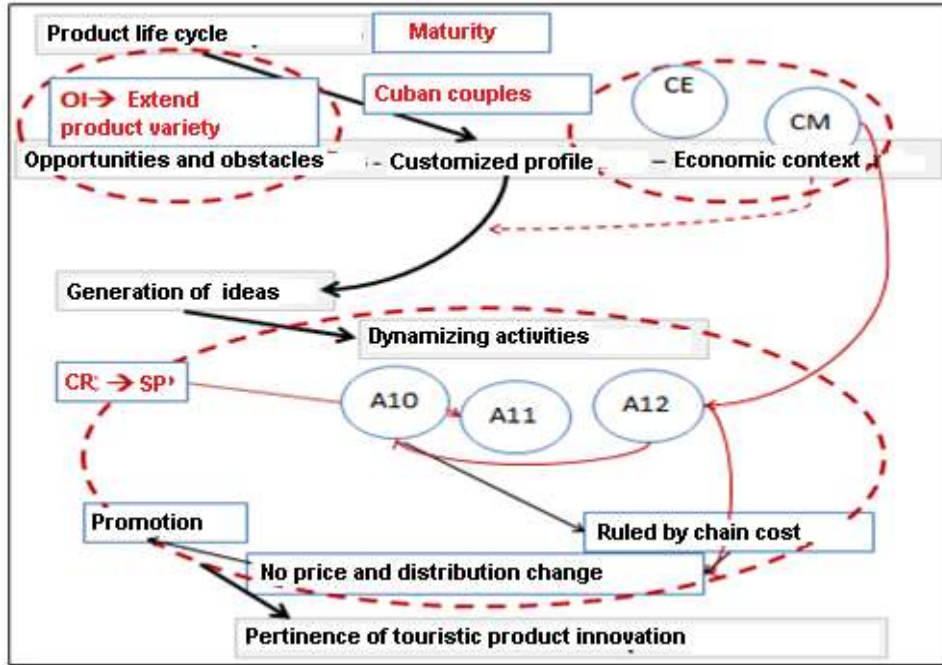
Fig. 3. Adaptative sequence of touristic product innovation in Meliá Cayo Coco Resort Hotel

Source: made by the authors

As shown in Fig. 3, it was developed as the first component of the life cycle in the resort hotel. The discontinuous lines show the feedback among components and activities of the procedure that generate major adaptative changes in innovation. Since the hotel was in the maturation phase, it required knowledge of customer profile evolution, of opportunities and obstacles, and the contexts that influence touristic product innovation; hence, the components were developed in parallel.

The need to include the segment Cuban couples to differentiate the wedding and honey moon product, particularly due to an increase in the number of nationals stemmed from the particularized profile of the customer. In the opportunities and obstacles, the need to extend the variety of products was identified, which led to a redefinition of work objectives to include the diversification of the wedding and honeymoon products, and extra services.

The characterization of contexts that influence touristic product innovation evidenced that the economic context mostly influenced on the specification of product weddings and honeymoons. Particularly, the effect of the type of change suggested the need to differentiate products offered to Canadians and Cubans by price.

Within the market context, through market competition, the potentialities of this facility to manage customer relations were determined, and the availability of several mechanisms to achieve that objective, and tourist validation, was corroborated. Therefore, customer satisfaction and income increase were part of the laid objectives.

The components that stimulated the emergence of new ideas were opportunities and obstacles in innovation, particularly, through customer needs and desires. In that case, 11 ideas were generated (five referred to novel and improved products in relation to weddings and honeymoons, and six extra services associated). The relative importance indexes produced a mean of 0.93; as a result, two ideas were excluded for failing to reach that value.

Upon obtaining the nine resulting ideas, they were broken down into customer requirements, and product specifications. A number of 12 CR and 9 PS were identified. In this case, some CR, due to the emergence and co-evolution of the procedure, that turned into PS (different price, customized service of the wedding and honeymoon coordinators, and theming), showed innovation adaptability to different implementation scenarios.

From the sociocultural contexts (facility aptitude for innovation, opportunity of continuous training), technological contexts (technological and market competences), PS emerged to meet CR, mainly based on staff training, and customized services. In this case, CR and PS higher than the direct competence became ten competitive advantages.

As one of the PS is different price, within the same activity (A10), the prices of touristic products generated without waiting for A12, were determined. As a final component of the procedure, product innovation pertinence was developed. In activity A13, profits were observed to increase in the first and second years following the introduction of novel and improved products.
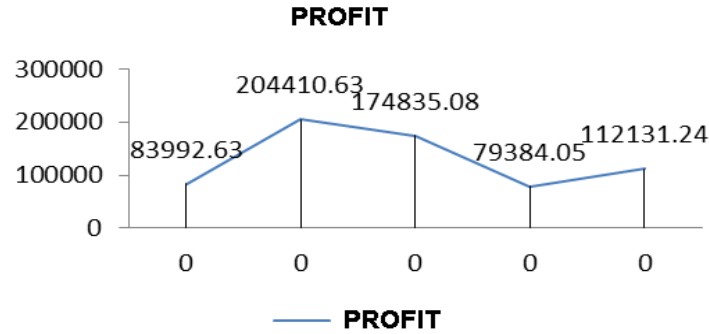
Fig. 4. Profits from the wedding and honeymoon products (Cuban convertible pesos)

Source: made by the authors

During the third year, profits decreased due to the opening of Meliá Jardines del Rey Hotel, which offers the same product, and introduces the improvements of Meliá Cayo Coco, which corroborates the need of systematization and continuity of innovation. During the fourth year, profit levels were recovered, as a result of an update in customer requirement and product specifications, which turned into competitive advantages. On the other hand, customer satisfaction for the product studied was 99.5%, since the introduction of the innovation.

Finally, the utilization of touristic product innovation helped meet the set objectives at Meliá Cayo Coco Hotel, with a more diversified product of weddings and honeymoons, and the extra services associated to the service, to achieve customer satisfaction in the hotel, its customization for Canadian and Cuban customers, and an increase of profits since the first year after the introduction of novel and improved products.

CONCLUSIONS

The suggested procedure worked during implementation as a complex adaptative system, since it generates adaptative characteristics that change the structure, and adapt the innovation sequence to the conditions of the hotel. Adaptability of touristic product innovation was evidenced in the sequence generated by SAC-InnoTour, according to the characteristics of the hotel, and the association rules activated by them.

Likewise, from the application of the procedure, needs and changes emerge, and hotel capacities are created, which cause constant adaptative process, and ensures the

continuity of innovation with the generation of novel and improved products. Accordingly, in Meliá Cayo Coco Resort Hotel, the procedure favored the generation of new wedding and honeymoon products, and related extra services. With the development of novel products, competitive advantages were generated for product differentiation, and a rise in customer satisfaction; which was evidenced in the analysis of pertinence, and the fulfillment of the work objectives set.

In further studies, the implementation of the proposal might extend to hotels with different features, in order to observe the adaptability of the procedure in each case, and study the regularities in that respect. Besides, the definition of innovation policies and strategies should be taken into account, especially if they consider fluctuation or adaptability of level indicators, not only for a hotel, but also tourist destinations or major resort destinations, to examine their operation as a complex adaptative system.

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Author contribution statement

Dr. Edianny Carballo-Cruz, Ph.D.: theoretical rationale, design and implementation of the procedure. Redaction of the results.

Dr. María E. Betancourt-García, Ph.D.: design of the procedure, and content review, redaction of the results.

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