

Evaluation of the **Information and Communications Technology** (ICT) culture applied to the webpages of the **hotel industry** in the Tarahumara Sierra, **Chihuahua, Mexico**

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Abstract | Tourism is a fundamental sector of services that seeks to satisfy the wants and needs of local population and tourists. Even though Mexico is positively affected by this activity with its sea and sun proposal, the ecotourism in the Tarahumara Sierra of Chihuahua, Mexico, yields poor results that must be analyzed. The following research pretends to illustrate the lack of ICT culture in the hotel of such region. For instance, from 126 hotels, exclusively 26 have a website allowing the analysis of scientific content. For the purposes of this study and the problems detected, the current methodology reviews existing hotels' models, in keeping with the requirements as set out by experts of digital media (Christou & Sigala, 2006; Luna, 2012; Garrido & Padilla, 2011) and allows the appropriate selection of pillars from the Webqual model (Loiacano, Watson & Goodhue, 2007). Further interviews with local experts permit the authors to reduce these pillars and to analyze the relevant webpages' content. The findings identify the limitations of the hotels and the urgent necessity to redesign their web pages to attract tourism. Finally, the following paper intends to help hoteliers to elaborate a policy on digital promotion which is expected to increase tourism and through this, to improve the socioeconomic development of the local community.

Keywords | Internet, New technologies, Hotels, Chihuahua, Mexico

Resumo | O turismo é um sector fundamental ao nível dos serviços, o qual procura satisfazer as necessidades da população local, assim como as dos turistas. Ainda que o México seja positivamente afetado por esta atividade devido à

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¹ Quality of Internet websites.

sua proposta de sol e mar, o ecoturismo em Tarahumara Sierra apresenta resultados medíocres que devem ser analisados. A presente pesquisa pretende ilustrar a carência de cultura ao nível das Tecnologias de Informação e Comunicação (TIC) nos hotéis desta região. Nomeadamente, num universo de 126 hotéis, apenas 26 apresentam *website*, permitindo a análise em contexto científico. Para efeitos de análise e dos problemas detetados, a presente metodologia revê modelos de hotéis existentes de acordo com especialistas em *digital media* (Christou & Sigala, 2006; Luna, 2012; Garrido & Padilla, 2011) e permite a selecção das dimensões a partir do modelo Webqual (Loiacano, Watson & Goodhue, 2007). Entrevistas adicionais com especialistas locais permitiram a redução destas dimensões, possibilitando o desenvolvimento da análise de conteúdo das *webpages*. Os resultados identificam as limitações desses hotéis e a necessidade urgente de redesenhar as suas *webpages* de forma a atrair turismo. Por último, o presente artigo tem o propósito de apoiar os hoteleiros e o Governo na elaboração de planos de promoção digital, promovendo um aumento do turismo e melhorando o desenvolvimento socioeconómico da comunidade local.

Palavras-chave | Internet, New technologies, Hotels, Chihuahua, Mexico

1. Introduction

Tourism is a key service sector for many economies especially for the emerging ones which face difficult wants and needs. Even when in 2012, México was ranked 10th as regard the reception of international tourists, it ranked only 24th as regards tourists' spending displaying a failure. Furthermore, Chihuahua in Northern Mexico and its Tarahumara Sierra, rich in ecotourism and ethnical culture has a strong touristic potential but not the expected success. The rudimentary use of quality websites in the region may lie at the heart of the problem factors such as web design, comprehensive information, payment security measures, effective communication between user and page are positively correlated with customer satisfaction (Lim, Cheong, Ding, Loo & Teh, 2012). Finally, satisfaction is closely related to repurchase, a requirement for a business to be profitable.

The use of ICT has an important impact on tourism, and, according to experts, its implementation is one of the larger issues in global tourism megatrends. By using in-depth interviews with experts and web contents analysis, this research aims to demonstrate from the consumers perspective the problem resulting

from a rudimentary use of the internet websites by the hotels in the Tarahumara Sierra to meet the demand. Hotels must seek solutions to increase the low demand, and the new ICT can provide an upgraded solution in hotel management and service (Camacho, 2012). To contribute positively to the socioeconomic and sustainable development of the country, tourism requires strategic and operational decisions based on the match between the requirements of potential tourists and the available supply. The use of ICT has redefined the roles of the business actors and has integrated new business practices.

2. Research objectives

According to Desplas (2010), the state of Chihuahua faces (i) an asymmetry in supply, (ii) an inadequate use of the websites for promotion, (iii) high prices of domestic air flights, and (iv) low quality service.

The present research focuses on the second area mentioned above namely inadequate promotion, i.e. limited use of websites for national and international promotion. The primary objective of this study is to

evaluate if the Mexican hotels of Tarahumara region can meet the requirement of the worldwide online marketing ICT standards.

To achieve this, it had been necessary to identify the relevant variables that websites should have to be both pleasing to the eye and user-friendly. The experts' opinions evaluate whether the current webpages fulfill these requirements. The study focused on the following specific objectives: (i) identify the needed experts in web design; (ii) interview regarding the relevance of selected pillars for Tarahumara Sierra; (iii) verify on whether the hotels' webpages facilitate operations via the internet; (iv) analyze the interactivity between the hotels' webpages and users; (v) appreciate their aesthetics; (vi) evaluate their usability; (vii) verify their innovativeness; (viii) rate the emotional influence of the webpages upon the buyer; (ix) check the interaction between webpages and business process; (x) evaluate their substitutability.

The benefits sought from this study reside in obtaining the necessary information for the hotels in Sierra Tarahumara to assist them in designing their websites in a more attractive and functional way for the user and to help them to implement innovation in e-tourism as a digital strategy for a hotel in a digital environment.

3. Literature review

Research will be primary. It will include an analysis of content of the websites in the hotels of Tarahumara Sierra in function based on validated items as determined by experts in digital media. Prior to the actual fieldwork, an exploratory research was made into the hotels' and quality webpages models. Afterward in-depth interviews were applied to experts on digital media with the request to adapt the answers to the peculiarities of the local industry.

The authors highlight a number of items of the hotel industry websites in dimensions used by researchers in various parts of the world: Greece (Christou & Sigala, 2006), Portugal (Chaves, Gomes & Pedron, 2012), Spain (Llopis, Gonzalez & Gasco, 2010), Hong Kong (Leung, Law, Fuchs, Ricci & Cantoni, 2012).

Garrido and Padilla (2011), in turn, summarize the items for measuring model variables in models of organizational factors of leadership (Garcia, Sanza & Trespalacios, 2005; Albers & Greve, 2006; Varela, Bande, Del Rio & Fernandez, 2007); technological factors (Chen & Ching, 2004; Chang, Liao & Hsiao, 2005); knowledge management factors (Chen & Chen, 2004; Lin & Lee, 2005), customer orientation factors and experience in Customer Relationship Management (CRM) (Banerjee, Hart & Hogg, 2004.) and financial & marketing output (Chen & Ching, 2004). The current research is aimed at achieving demand side analysis from the tourist perspective.

Christou and Sigala (2006), Loiacano et al. (2007), Barnes, Liu and Vidgen (2001) and Cha and Lee (2011) considered the Webqual¹ to be a reliable and valid model that synthesizes the digital quality dimensions of service.

Luna (2012) focuses on the importance of structured interviews to know more about the decision making process while Camacho (2012) designs an interview with close-ended questions about digital culture for managers of Spanish hotels. In the current research, in-depth interviews were made to experts in the field of digital media as a prelude to content analysis of the hotel websites. The interviews were conducted in a semi-structured format to have flexibility in the selection of the relevant items. This corresponds to the resolution of objectives 1 and 2.

4. Methodology: Research design and planning

The conducted empirical research is focused on an exploratory study based on two instruments:

¹ For quality of Internet websites.

- First, in-depth interviews for experts to determine the relevant factors required for the hotels webpages.
- Second, a content analysis – conducted by experts – of the websites of all the hotels in the Tarahumara Sierra. The sampling plan was applied in the case of all the hotels included in the official list of the Ministry of Tourism of the Chihuahua State Government from 1-4 stars ($N = 126$) and the hotels with websites ($n = 26$).

4.1. Empiric study: Methodology

4.1.1. Expert sampling plan and development:

The sample unit is defined by residents of Chihuahua who are either experts in either graphic design and/or web design with an experience of at least ten years in their field, and who also have tourism knowledge. Seven experts fulfilled the above requirements and were selected to answer the in-depth interview in the first semester of 2013. To evaluate the hotels and process the information from the perspectives of the user and the demand side, the authors decided to use the Webqual model because it focuses the emphasis on the users' perceptions rather than on the designer (Barnes & Vidgen, 2002).

Defining the pillars:

The authors conducted in-depth interviews to the seven experts using semi-structured questionnaires from the dimensions of the Webqual model. In a first round, they were asked to analyze those dimensions to decide whether or not they are reliable and viable in the Sierra context. They reduced the twelve dimensions to ten by eliminating the brand and image and the emotional appeal dimensions. The hotels of Sierra Tarahumara are looking first and foremost to be promoted at a national and international level. As they do not have an image outside the region, the dimension of image and brand was eliminated. In addition the experts

rejected the emotional perception felt by tourists when navigating the website as too subjective. They added that the web pages of Sierra hotels are too rudimentary to influence the buyer with a positive emotion. Determining the items:

In the second round, a semi-structured interview regarding the main items was developed and applied to achieve their identification. Experts had the freedom to adhere more items to the list. Dimensions 1 and 3 including the digital security variable were joined to form pillar 1 of the digital tools necessary to properly carry out the desired task. Similarly, dimensions 2 and 4 were reduced into pillar 2, as these items are part of pillar 2 in the consumer interactivity capacity. In parallel, the dimensions 5 and 7 related to design, aesthetics and visual appeal were reduced to pillar 3. The third round summarizes the reduced model remains as a new model with seven pillars. A further query decides the relevance of the attributes of hotels webpages and the requirement to ensure that the latter are meeting the requirements. Some of the items located in the seven pillars were selected by the experts, who also highlighted those that were considered to be the most relevant for the evaluation of the basic websites.

Refining the instrument:

The final model was refined by three rounds of revised, eliminated and redundant dimensions. This resulted in an instrument with 23 questions measuring 7 pillars which were applied to the hotel sample ($N = 126$ and $n = 26$). Table 1 summarizes the determination of a basic model for Tarahumara Sierra starting from the dimensions and items of the Webqual models. The measurement, sample size and the problem statement objective for each are also shown. According the operationalization of the factors, the chosen metric is related to each item in the content analysis. For most of them, the authors decided that if the webpage has the given item $\varphi = 1$; if it does not $\varphi = 0$. Some items have a strong level of subjectivity and the measurement was made based on the experts' considerations. For instance

Table 1 | Evolution of the framework for the basic characteristics of Sierra Tarahumara, Chihuahua.

Determination of pillars and items					
Names	Barnes & Vidgen, 2002	Loicano, Watson & Goodhue, 2007	Barnes, Liu & Vidgen, 2001, p. 116; Cha & Lee, 2011, p. 239	Desplas, Vargas & Sotelo, 2014, 1 st round: (eliminations) 2 nd round (reductions)	Desplas, Vargas & Sotelo, 2014 3 rd round (Explanations in the text)
Model	Webqual Dimensions	Webqual Dimensions	Webqual 4.0 Dimensions	Pillars for the Tarahumara Sierra	Basic pillars for the Sierra
Problem statement objective	Measure the quality of bookstore sites by offering user's perceptions	Assess the quality of webpages by evaluating the user's experiences	Evaluate wireless internet of new sites		Evaluate from the perspective of the tourist if the basic quality of hotels webpages can meet the international standards
Dimensions & items	1.Information quality: content, accuracy, format, relevancy 2.Usability: service interaction, navigation, appearances 3.User quality or service interaction: empathy, issue of transaction, information security, product delivery, communication with the site owner; mobility	1.Perceived usefulness: fit to task, tailored communication, trust, response time 2.Perceived ease of use: design appeal, intuitive operation 3.Entertainment: Visual appeal, innovativeness, emotional appeal 4.Complementary relationships: consistent image, online completeness (business process), substitutability	1.Usability: easy to operate, clear and understandable interaction, easy to navigate, easy to use; design (attractive appearance, appropriate to the type of site, sense of competency, positive experience to user) 2. Information: accurate, believable, timely, relevant, easy to understand, right level of detail, in appropriate format 3. Service interaction: trust (reputation, safe to transaction, personal information); Empathy (personalization, sense of community, easy communication, confidence that services will be delivered as promised)	1.Information (reduced): appropriate, secure and updated content 2. Interaction (reduced): easy interaction, personalized information 3.Trust (reduced): online security and privacy 4. Response time and space (reduced): quick load and responses, space for comments and complaints 5. Design and aesthetics (reduced): aesthetics, colors and paging 6. Intuition and usability of the webpage: Tourist options in the websites, easy to navigate, easy to use 7. Visual appeal (reduced): attractive contents, videos, home page, links 8. Innovation: uniqueness, recent news, certification, updated news. 9. Flow-emotional appeal for online users (eliminated): positive emotions from websites to buyer 10. Brand and image, (eliminated): image, region brand 11.Integration with management processes: visualization of prices and promotions, buying conditions 12. Substitutability of the webpage: phone number, social network, links, call option	1.Reservation facilitation and security via internet (1+3): Calendar, products photo gallery, languages 2.Users interactive capacity (2+4): availability and rates search; description of packages; description of services provided 3.Aesthetics, Design and Visual appeal (5+7): font type, easy reading, images, information set up 4.Usability: easy navigation through the site, space for inquiries, comments and complaints, response time 5.Innovation: Unique news and anecdotes, certification, update less than a year, updated news 6.Business process completeness: visualization of prices and promotions, buying conditions, shopping cart 7.Substitutability phone number, social network, links, call option
Measurement	Online questionnaires 7-point Likert scale. Open comments	Questionnaires 7-point Likert scale	Online questionnaires 7-point Likert scale		Content analysis to webpages by experts. Item by item: If the webpage has the item $\varphi = 1$; if it hasn't $\varphi = 0$ Open comments
Sample size	376 responses	646 students visiting websites	32 respondents		N = 126 hotels in Tarahumara Sierra, Mexico n= 26 hotel with websites by using 7 pillars, 23 items

Source: Own construction.

for the item image, the value measure was: if the experts consider that the images are appropriate and attractive for the user $\varphi = 1$; if not $\varphi = 0$. The total of all experts and all items results determined the results as given in Table 2.

4.1.2. Sampling plan of websites from hotels and execution

The authors found it wise to use the web content analysis for the current study. Indeed, such analysis is a research tool for the social sciences focused on the study of the contents of communication, such as the websites. Analysis of symbolic network material makes it possible to discover trends in content, compare levels of media in the hotels webpages, and get strategic information for the development of a digital operational plan for hotels in the future.

Referring to the list of 126 hotels, content analysis showed that only 20.6% of the 1-4 stars hotels have a network. Then, the drastic reduction of the sample accelerated the analysis of each item selected. Each of the seven experts was able to analyze the 26 hotel sites.

The final stages of implementation included gathering information, data analyzing, and communicating the results. They allow the resolution of objectives 3-10.

5. Results

Figures 1 to 7 show the evaluation of each item. Pillar 1 (Figure 1) shows that eighteen of 26 hotels (69%) have a photo gallery for its promotional purposes, thirteen (50%) have an English version of the site and five (19%) sites provide a reservation schedule. The photos provide security and confidence for potential guests on the quality of facilities.

In figure 2, the pillar 2 aims to measure the ability on the website to interact with the Internet

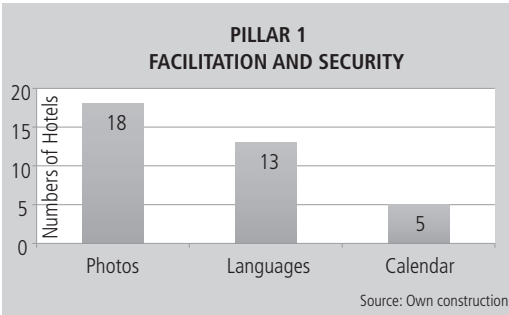


Figure 1 | Resolution of objective 3 and evaluation of pillar 1.

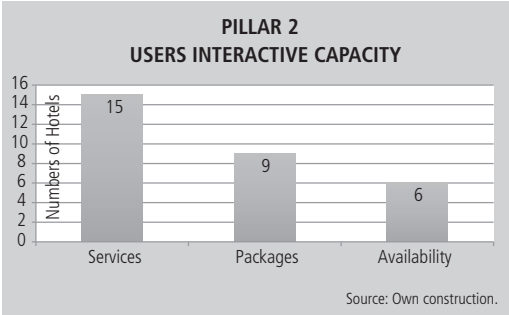


Figure 2 | Resolution of objective 4 and evaluation of pillar 2.

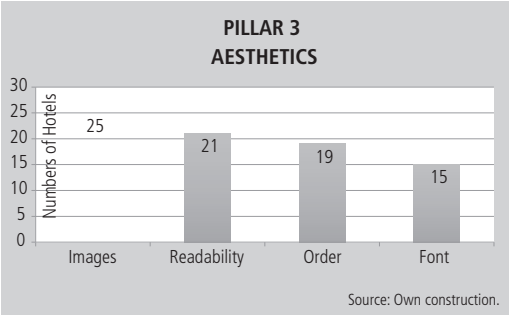


Figure 3 | Resolution of objective 5 on pillar 3.

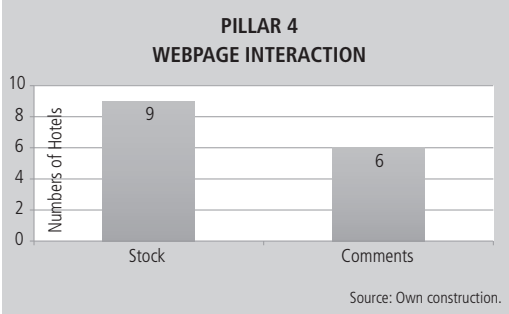


Figure 4 | Resolution of objective 6 on pillar 4.

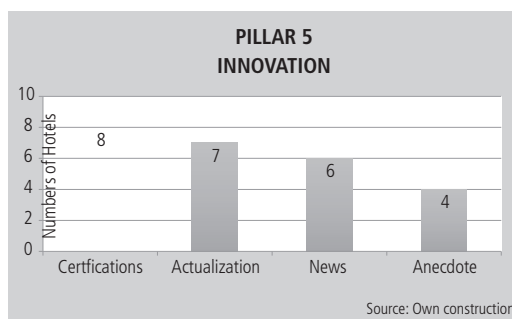


Figure 5 | Resolution of objective 7 on pillar 5

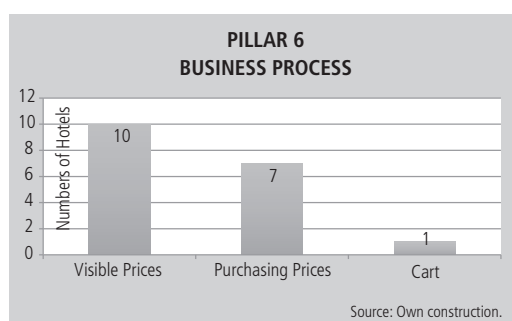


Figure 6 | Resolution of objective 9 on pillar 6.

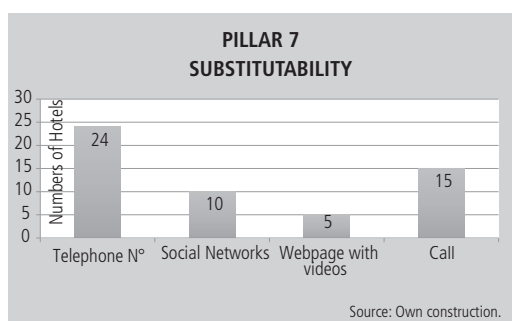


Figure 7 | Resolution of objective 10 on pillar 7.

user. By analyzing the fifteen hotels (57.6%) out of 26 that have a search service availability and rates, nine of them (34.6%) have a clear description of the packages and six of them (23%) give an accurate description of the services provided.

Figure 3 shows the results for pillar 3 (aesthetics). 25 hotels (96%) have images on their page, 4% have a blog without images. 21 of them (80%) are easy to read, fifteen of them (57.6%) have an

appropriate font and nineteen of them (73%) have an attractive information format.

Figure 4 demonstrating pillar 4 shows that only nine hotels (34.6%) have online booking and only six of them (23%) allow users to make comments.

Figure 5 (pillar 5 of innovation) shows that only eight hotels (30.7%) have certification, only seven of them (26.9%) have updated their site in the past year, only six (23%) contain recent hotel news and just four of them (15.3%) have reviews or anecdotes.

Figure 6 (showing the results for pillar 6) focuses on business process highlighting the major failure in the sector: only ten hotels (38.4%) have readily visible prices, only seven of them (26.9%) explained the conditions of purchase and only one (3.8%) proposes a shopping cart.

The results for pillar 7 can be seen in Figure 7 with 24 hotels (92.3%) give hotels with a direct phone number, fifteen (57.6%) provide the option to call later, ten (38.4%) give the link to their social networks and five (19.2%) are linked in to YouTube videos as an additional resource.

Overall findings:

- Of the 26 hotels with a website or blog, findings show that half of them have their webpage in English. Eighteen provide pictures of the hotel facilities, and five of them have a calendar.
- Fifteen of the 26 hotels have a search tool for availability and rates, and only nine have this same for packages.
- From an aesthetic point of view, 25 have images, 21 are easy to read sites, nineteen have a good visual set up, and fifteen are pleasant and easy to read.
- The interaction of tourists with the hotel is only for booking only in nine of the cases and the option of posting comments is possible in only six cases.
- In terms of innovation and creativity, eight hotels have certifications, seven updated their webpage in the last year, six have posted recent news, and four provide historical anecdotes.
- Facilitating the business process is even more

Table 2 | Results matrix of variables selected by experts for the hotel sector of Sierra Tarahumara.

Result Matrix for selected variables by experts		
Disaggregated pillars and analyzed variables	% calculated from hotels with an Internet webpage in Tarahumara Sierra (n=26)	% calculated from the total of hotels in Tarahumara Sierra (N= 126)
Pillar 1: Reservation facilitation via internet		
Calendar	19	3.9
Product photo gallery	69	14.3
Languages	50	10.3
Pillar success percentage	46.1%	9.5%
Pillar 2: Users Interactive capacity		
Availability and rates search	57.6	11.9
Description of packages	34.6	7.1
Description of services	23	4.7
Pillar success percentage	38.4%	7.9%
Pillar 3: Aesthetics		
Font	57.6	11.9
Easy reading	80	16.6
Images	96	19.8
Information set up	73	15
Pillar success percentage	76.9%	15.8%
Pillar 4: Webpage users' interaction		
Easy navigation through the webpage	34.6	7.1
Space for comments	23	4.7
Pillar success percentage	28.8%	5.9%
Pillar 5: Innovation		
Anecdotes	15.3	3.1
Certifications	30.7	6.3
Updated webpages	26.9	5.5
Updated news	23	4.7
Pillar success percentage	24%	4.9%
Pillar 6: Business Process		
Prices and promotions	38.4	7.9
Buying Conditions	26.9	5.5
Shopping cart	3.8	0.8
Pillar success percentage	23%	4.7%
Pillar 7: Substitutability		
Telephone number	92.3	19
Social weblinks	38.4	7.9
Video weblinks	19.2	3.9
Call later option	57.6	11.9
Pillar success percentage	51.9%	10.7%

Source: Own construction.

rudimentary: only ten hotels have visible prices, seven provide information on the buying conditions, and only one has a shopping cart.

- There are ways to substitute internet contact to book: 24 of the 26 provide a direct phone number, ten are active in social networks with a link from the home page, and five have links with videos.

If the analysis is extended to the entire hotel industry in the area, the figures become catastrophic. Hoteliers have to assume the digital innovation failures that become more evident as shown in the matrix results for each item in Table 2.

Table 2 makes possible to note the success rates of each pillar on average based on the total number of hotels as compared to those having their own Internet page. The results are very diverse but equally disappointing.

6. Conclusions

The rapid development of information technology, the customer relations management and the Internet expansion have transformed the relationship between consumers and the suppliers by potentiating it. By studying the only 26 hotels with Internet pages, the authors have determined which variables are the weakest representing a large degree of digital failure and which represent a challenge for the hotel operator.

The pillars used more appropriately for the websites of those hotels are highlighted as a result of content analysis:

- Pillar 3 'Aesthetics', with eighty points out of 104, i.e. a success rate of 76.9%.
- Pillar 7 'Substitutability', with 54 points out of 104 shows a success rate of 51.9%.

If the consideration for failure is a percentages under 50%, all the other pillars, based to the sample

evaluation, have bad results for the hotels with websites and represent a failure of the item. Based on our findings, the pillars of urgent priority to improve websites are given below with the present status given in percentage in parentheses:

- Pillar 1 'Facilitates reservations via Internet' (46.1%).
- Pillar 2 'Interactivity with the user' (38.4%).
- Pillar 4 'User interactions with the webpage' (28.8%).
- Pillar 5 'Innovation' (24%).
- Pillar 6 'Business processes' (23%).

Our findings show that the aesthetical pillar has the highest score and the business process of online reservations has the lowest. The pillars of business, interaction, ability and innovation require urgent improvement due to their extremely low results. For the reviewed authors, models dimensions of technological and business factors are relevant and customer oriented factors for success. The evidence shows that the studied hotels have not in consideration the ICT issue as a priority to solve. Their webpages are still well below expectations and may not play an important role in the digital explosion of ICT, hence international tourists are not able to gather sufficient digital information on the region.

Concerning the main limitations of this study, four are detected: (i) The small sample used (ii) the subjectivity of some items in the content analysis, (iii) the selection of experts; and (iv) the customization of the international models. Indeed, this study is based on a small sample of hotels webpages as 79.4% do not have websites, which diminishes strongly the quantity of hotels to study in the zone. Future studies should further investigate the feasibility of replicating on larger scale of hotels in zone that are similar from the environmental and economic aspects. In addition, the current study is limited by the subjectivity as regards the experts' answers to items. In order to diminish this subjectivity, the authors also suggest that for further studies, the

experts have to be chosen from diverse personal and professional backgrounds. Finally, the international hotels models should be always customized, based on the business and the ICT culture of the analyzed region.

Mexican hoteliers should allocate extra resources for making the websites efficient and accurate in business processes, interactive, innovative and community builders to facilitate attracting tourists. The findings of the present study will assist them in redesigning their webpages to be more attractive for the user and implementing innovation in field e-tourism as a needed digital strategy. The suppliers must comply with the new requirements and totally reinvent their processes.

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