Information Technology Competency Scale applied to the Hospitality Industry

Adriana L. FERNANDES
Instituto Universitário de Lisboa (ISCTE-IUL)
ISTAR-IUL
Lisboa, Portugal
adriana.fernandes@iscte.pt

Bráulio ALTURAS
Instituto Universitário de Lisboa (ISCTE-IUL)
ISTAR-IUL
Lisboa, Portugal
braulio.alturas@iscte.pt

Raul M. S. LAUREANO
Instituto Universitário de Lisboa (ISCTE-IUL)
BRU-IUL
Lisboa, Portugal
raul.laureano@iscte.pt

Abstract

This article aims to validate an instrument that can measure Information Technology in the hospitality industry. The main study focused on the hotel industry and it was conducted with 216 employees of two different hotel groups in Brazil and Portugal. An instrument developed by Tippins & Sohi (2003) was translated into Portuguese and adapted for the hospitality industry. Later, an exploratory factor analysis was made in order to verify the psychometric properties of the version translated and adapted. In addition, a short-form scale version was developed. The results indicated that the scale could be reduced to nine items without compromising psychometric properties of the full-length scales. Finally, it has been found that the scale was capable of measuring differences in IT competency between groups. The results show that managers have greater IT competency than employees. Regarding the different hotel groups was noticed that they have significantly equal means for IT operations and IT knowledge. Therefore, hotels which could improve these two factors might be the ones which will be able to differentiate themselves and create competitive advantage. Theoretical and practical implications of the study are also discussed.
Keywords: Information Technology, Hospitality Industry, Short-form Scale.

1. Introduction

The hospitality industry is seen as the heart of the tourism industry (Rogerson & Kotze, 2011; Kokt & Ramarumo, 2015). It consists of a wide range of service industries including hotels, food service, casinos, clubs and corporate events and tourism (Brotherton & Wood, 2008). In countries like Brazil and Portugal it represents a significant portion of the Gross Domestic Product (GDP), contributes to job creation and stimulates economy (Deng, 2011; Kokt & Ramarumo, 2015).

The evolution of information technology (IT) has radically altered the way in which companies in this industry have worked, especially in regard to customer service refinement and improvement of business operation (Law, Leung, Au, & Lee, 2013). The role of IT has, thus, thoroughly shifted from a backstage supporting tool to a substantial strategic tool (Ham, Kim, & Jeong, 2005; Law et al., 2013; Melián-González & Bulchand-Gidumal, 2016).

In view of the changes that have taken place, researchers and hospitality industry professionals have become aware of the IT potential to, among other things, establish competitive advantages, reduce costs, increase productivity, improve organizational performance and to develop the learning process organizational (Real, Leal, & Roldán, 2006; Law et al., 2013).

Some work has been done with the purpose of verifying the effect that the implementation of IT applications or objects have in the development of the work (Ham et al., 2005). However, to understand the influence that IT has on organizational variables is necessary to consider more than just IT objects (Real et al., 2006; Bulchand-Gidumal & Melián-González, 2011). It is also important to understand how the implemented technologies are used to manage the information within the company and how organizational actors dominate them as working tools (Tippins & Sohi, 2003). In

other words, the fact of owning technological tools might not generate, from the company, competitive advantages, and it might be misunderstood and misused.

In this sense, to have a tool to assess the IT adapted to the hospitality industry, reflecting the real complexity of the concept, which not only involves hardware and software of a company but also the knowledge we have of IT, is critical. Thus, this study aims to validate an instrument that reflects the theoretical complexity of the concept of IT, named in this study of IT competency scale, in the hospitality industry companies. In addition, this study aims to identify differences in proficiency of IT competency between different hotel groups, and between managers and employees.

In practical terms, the scale developed here could help managers with information about the efficiency of the technology adopted, about how it is being used and if professionals are able to use it properly. With this information, managers will be able to verify what needs to be adjusted and what strategies to develop. The scale established here can be used in future theoretical and empirical tests applied to the hospitality industry, which aims to measure and relate the constructs presented here to other constructs.

2. Information Technology in the Hospitality Industry

IT is becoming, increasingly, an integral part of the management tools of organizations due to the increasing dependence of information and knowledge (Rau & Haerem, 2009; Ham et al., 2005). They accelerate the speed in which information is acquired and disseminated throughout the company and help to ensure that every member in the company is up to date, regarding the relevant market information. In addition, through the IT, members in a company could more easily share individual interpretations of information and, consequently, generate, in a more efficiently way, consensus (Tippins & Sohi, 2003; Iyengar, Sweeney, & Montealegre, 2015).

In the hospitality industry the situation is no different. IT is gradually becoming a key source of sustainable competitive advantage, particularly in the areas of promotion, distribution, development, organization and delivery of hospitality products (Ham et al., 2005). It is true that the hospitality industry is not guided by the nature of the technology (Bulchand-Gidumal & Melián-González, 2011), but the increasing demands of sophisticated customers, along with the industry intensive need for information, are leading managers to adopt IT, to meet the current and future business requirements (Law et al., 2013).

The use of IT has become an important reference in the creation of strategic alliances, of the development of methods and in the communication with customers and partners. In addition, customers, increasingly demanding, made the industry to develop various types of IT applications, including self-service kiosks, online check-in, and internet and email applications (Law et al., 2013).

However, studies that explored the influence of IT on the organizational performance (Dos Santos & Peffers, 1995; Dewett & Jones, 2001; Tippins & Sohi, 2003; Dodgson *et al.*, 2013), paradoxically to what was expected, do not always find a positive result. In other words, investments do not always contribute, directly, to increase productivity (Solow, 1987). One explanation is that there are contextual variables that can act as moderators in the relationship between investment in IT and organizational performance (Bulchand-Gidumal & Melián-González, 2011). Some studies highlight the organizational learning (Tippins & Sohi, 2003; Real, Leal, & Roldán, 2006), others highlight the human ability (Bharadwaj, 2000; Powell & Dent-Micallef, 1997).

Tippins & Sohi (2003), which have studied the relationship between IT and organizational performance through resource-based view (RBV), understand that IT *per se* may not generate a sustainable advantage (Barney, 1991), and should not be studied as a stand-alone feature, because it can be easily imitated by competitors. These authors believe that IT can provide benefits for the organization if combined with other organizational resources through the complementarity and co-specialization (Powell & Dent-Micallef, 1997).

Given the concept of co-specialization, understood as the fact that a resource has little or no value without the presence of another, Tippins and Sohi (2003) developed the concept of IT competency, understood as "as the extent to which a firm is knowledgeable about and effectively utilizes IT to

manage information within the firm. Included in this conceptualization is the assumption that firms also possess IT objects"(Tippins & Sohi, 2003: 4).

The concept of IT competency has three dimensions. The first is the IT objects that are related to tools, like software, hardware, operating systems, support staff, internet, and intranet. The second dimension is the IT operations understood as methods, processes and skills required to complete a focal task. Finally, the third dimension is IT knowledge linked up to how the company has technical awareness of IT objects (Tippins & Sohi, 2003). This perspective was considered the most appropriate, and thus, followed in this study.

3. Methodology

This study was divided into four phases. At first, the instrument was translated into Portuguese and its content was validated in the hospitality industry. In the second phase, we held an Exploratory Factor Analysis (EFA) in order to verify the latent structure of the scale for the hospitality industry. In the third phase, a short-form version of the scale was developed. Finally, the last part describes IT competency in different population groups.

3.1 The full-length scale and development of the Portuguese version

The scale used to measure IT in this study mainly derives from the scale proposed by Tippins and Sohi (2003), who used it to measure what the authors call IT competency, in products' industries. In this study the scale will be tested specifically in hospitality companies.

The scale is originally composed of 15 items distributed in three dimensions: IT knowledge, IT Operations and IT objects, and a questionnaire, related to these items, was made in order to measure the IT competency. The questions were made into statements and respondents had to answer according to their degree of agreement. This was measured on a Likert scale of seven points ranging from 1 (strongly disagree) to 7 (I totally agree). The 15 items were positively worded (e.g, "The hotel has a formal department that deals with the Information Systems Management").

In the first phase of the study, special attention was given to the translation of the original version of this scale into Portuguese to capture their linguistic nuances. The translation was made following methodological procedures previously used by several authors (Beaton, Bombardier, Guillemin, & Ferraz, 2000). Three different translators, officially proficient in English, firstly translated the scale into Portuguese. Then the contents of the translations were analysed and compared by researchers (two Portuguese and one Brazilian). After this, a unique Portuguese version, product of a consensus view, was produced, preserving its semantic content.

A fourth translator, who did not know the scale, translated this version back into the original language. This translation was then compared with the original scale, in English, by one of the authors and by a linguist, in order to ascertain that the meaning of the questions was kept. This analysis led to several fixes related to linguistic and semantic equivalence. Subsequently, the scale was adapted to the hotel industry context taking the first version of IT Competency Scale in Portuguese to this industry.

This version of the scale underwent a content validation as regards hotel industry. It was analysed by a director of a Portuguese hotel group, by a hospitality consultant in Brazil, by a manager of the *Associação Brasileira da Indústria de Hotéis* (ABIH) and a manager of the *Associação da Hotelaria, Restauração e Similares de Portugal* (AHRESP). The aim was to ensure that the scale items were relevant and general to all hotel industries, and after some corrections, the second version of the IT Competency scale was obtained.

Once the content's validation was concluded, all needed steps were taken to create a pilot study with employees from 10 hotels, in order to assess the language and the instrument's content. Once again, the items of the scale suffered adjustments so that all individuals were able to fully understand the statements that made up the scale.

The final item pool was, therefore, used to validate the survey's instrument that also consisted of 15 items distributed in the three dimensions designed in the original scale. Responses were also

classified according to the Likert scale of seven points ranging from (1) "Strongly disagree" to (7) "Strongly agree".

3.2 Sample and data collection

The Top 10 hotel groups from the Atlas da Hotelaria 2014 of Deloitte Consultores S.A. (Deloitte, 2015) was selected as the sample. The main managers of hotel groups, that have investments in Brazil, were contacted. The purpose was to apply the questionnaire in Portugal and Brazil. Two groups agreed to participate. 650 employees and managers were surveyed, in order to capture the view of the entire organization about the existing IT and its use.

Of the 650 questionnaires sent, only 258 were filled in. Of these, 42 questionnaires were excluded from the sample for inadequacy or incomplete filling. Thus the effective sample size was of 216 participants. The demographic characteristics of the sample can be seen in Table 1.

The sample is mainly composed of employees (56.5%), of the male gender (50.5%) with an average age of 38.46 years and with university degree (52.8%). Regarding the characteristics of the hotels studied, the sample is mainly formed by hotels that operate predominantly in leisure activities (38.4%), having 4 stars or more (89.8%), with more than 251 housing units (59.4 %), which feature large hotels. The statistical analysis was performed with the statistical package software SPSS version 23.0 for windows.

Table 1 - Demographic characteristics of the sample

	Sample N=216		Sample N=216
Gender		**Hotel's Operating Area**	
Female	49.5%	Fully business	3.2%
Male	50.5%	Predominately business	21.8%
Age		Business and leisure	36.6%
	Mean: 38.46	Predominately leisure	34.7%
	Median: 38.00	Fully leisure	3.7%
Education		**Hotel Location**	
Basic	7.9%	Portugal	73.1%
High school/Professional	39.4%	Brazil	26.9%
Undergraduate degree	37.5%	**Hotel classification**	
Graduate degree	15.3%	3 stars	10.2%
Function in Hotel		4 stars	45.4%
Manager	43.5%	5 stars or more	44.4%
Employee	56.5%	**Housing units**	
		Less than 100 units	16.7%
		101-200 units	8.8%
		201-250 units	17.1%
		251-300 units	13.0%
		301 units or more	46.4%

4. Results

4.1 Exploratory Factor Analysis

In order to confirm the latent structure of the scale, regarding factors and variables for the hospitality industry, an Exploratory Factor Analysis (EFA) was conducted.

EFA was performed with all the 15 items of the scale. Initially a Kaiser-Meyer-Olkin (KMO) was performed to evaluate the sampling adequacy in terms of variables and factors. The KMO value should be greater than .6 for proceed, and should interpret satisfactorily a factor analysis solution and a Bartlett's test of Sphericity (Hair, Black, Babin, & Anderson, 2010). KMO analysis revealed a value of .904, indicating that the correlation matrix was suitable for factor analysis. In addition, the Bartlett's test of Sphericity was highly significant (2157.05; $p < 0.001$), therefore the variables are significantly correlated.

The internal consistency obtained with the Cronbach's alpha indicated values of .929 for the entire sample with 15 items. Cronbach's alpha is defined as "acceptable" when is higher than 0,7 (Nunnally & Bernstein, 1994), indicating good internal consistency of the scale. Table 2 shows the corrected item-total correlation and internal consistency (Cronbach's alpha), even if the item is

deleted. All items showed correlation with a total scale of more than 0.3, a value below involve an exclusion of the factor (Castillo, Macrini, Cheniaux, & Landeira-Fernandez, 2013).

Table 2 - Corrected item-total correlation and internal consistency (Cronbach's alpha) if the item is deleted

Item	Corrected item-total correlation	Cronbach's alpha if item is deleted
1. Overall, our technical support staff is knowledgeable when it comes to computer-based systems. *A equipe de suporte técnico é experiente quando se trata de sistemas informáticos.*	.636	.925
2. Our firm has got a high degree of computer-based technical expertise. *O hotel possui um alto grau de conhecimento técnico baseado em Tecnologias da Informação (TI).*	.757	.922
3. We are very knowledgeable about new computer-based innovations. *Os colaboradores estão bem informados sobre inovações baseadas em TI.*	.694	.923
4. We have the knowledge to develop and maintain computer-based communication links with our customers. *Os colaboradores têm conhecimento para desenvolver e manter ligações com os clientes por meio das TI.*	.677	.924
5. Our firm is skilled at collecting and analysing market information about our customers via computer-based systems. *O hotel é hábil na recolha e análise de informações de mercado sobre os clientes através de sistemas baseados em TI.*	.706	.923
6. We routinely utilize computer-based systems to access market information from outside databases. *Os colaboradores rotineiramente utilizam sistemas baseados em TI para aceder informações sobre o mercado utilizando bases de dados externas.*	.685	.924
7. We have set procedures for collecting customer information from online sources. *O hotel possui um conjunto de procedimentos para a recolha de informações de clientes a partir de fontes on-line.*	.539	.928
8. We use computer-based systems to analyse customer and market information. *Os colaboradores utilizam sistemas baseados em TI para analisar informações de clientes e mercado.*	.700	.923
9. We utilize decision-support systems frequently when it comes to managing customer information. *Os colaboradores utilizam os sistemas de apoio à decisão com frequência quando se trata de gerir informações de clientes.*	.750	.922
10. We rely on computer-based systems to acquire, store, and process information about our customers. *Os colaboradores contam com sistemas informáticos para adquirir, armazenar e processar informações sobre os clientes.*	.741	.922
11. Our company has a formal MIS department. *O hotel tem um departamento formal que trate da Gestão dos Sistemas de Informação.*	.616	.925
12. Our firm employs a manager whose main duties include the management of our information technology. *O hotel tem um gestor que possui como uma das principais atribuições a gestão da tecnologia de informação.*	.640	.925
13. Every year we budget a significant amount of funds for new information technology hardware and software. *Anualmente o hotel (ou o grupo a que pertence) inclui no seu orçamento uma quantia significativa para novas tecnologias da informação (hardware e software).*	.603	.926
14. Our firm creates customized software applications when the need arises. *O hotel (ou grupo a que pertence) cria aplicações de software personalizadas quando a necessidade o exige.*	.611	.926
15. Our firm's members are linked by a computer network. *Os colaboradores do hotel estão interligados por uma rede e/ou sistema informático.*	.536	.927

Factors were taken out through the principal component extraction with varimax rotation. Factor loadings were assessed for each item, in each factor, and established a cut point 0.50. To set the number of factors (to extract) it was used the latent root criterion, a percentage of the variance and a screeplot. The analysis indicated three factors; however, items 5 and 10 revealed some problems, with significant Loads in two factors, namely, factors 1, 3 and 1 and 2. Thus, those items

were removed, as proposed in the study of Dawson, Abbott, and Shoemaker (2011). After removing these factors, an analysis was performed again and it was found out that the internal consistency of the scale remained, indicating a Cronbach's alpha value with 0.915. Communalities were also examined in order to evaluate how much variance of each item was accounted for the extracted factor. All items presented communalities higher than .50.

The three factors were responsible for 70.05% of the total variance. The reliability of the factors was obtained with the Cronbach's alpha, as suggested by Hair et al. (2010), who points that accepted Cronbach α coefficients are usually higher than .6 (Nunnally & Bernstein, 1994). Table 3 shows the factor loadings of the items in each factor, along with their respective eigenvalues, the percentage of variance explained, and reliability scores.

Table 3 - Exploratory Factor Analysis

Factors and items	Item loadings	Eigenvalues	Variance explained (%)	Scale alpha	Mean for factor
Factor I: TI objects		**3.15**	**24.22**	**0.840**	**5.36**
Item 14	.767				
Item 11	.749				
Item 15	.740				
Item 12	.738				
Item 13	.635				
Factor II: IT knowledge		**3.14**	**24.14**	**0.890**	**4.91**
Item 3	.840				
Item 4	.826				
Item 2	.756				
Item 1	.715				
Factor III: IT operations		**2.82**	**21.69**	**0.874**	**5.01**
Item 8	.841				
Item 7	.808				
Item 9	.750				
Item 6	.653				

After varimax rotation

Factor I, IT objects: It is associated with facilitating the production and dissemination of information within hotels, such as information systems, hardware and software, and support personnel. This factor explained 24.22% of data's variance, with an eigenvalue of 3.15. The reliability for this factor was .840.

Factor II, IT knowledge: it expresses how well informed are the people who work in hotels about IT objects and how they use them in their processes. The second factor explained 24.14% of the variance of the data, with an eigenvalue of 3.14. The reliability for this factor was .890.

Factor III, IT operations: it is linked to how hotels use IT in their information management processes related to customers and to the market where they operate. Explained 21,69% of the variance of the data, with an eigenvalue of 2.82. The Cronbach's alpha for this factor was .874.

4.2 Short-form version of IT Competency Scale

After validating the scale for the hospitality industry, a short-form version of the scale was developed. The item selection procedure was based on the statistical methodology reported by Marteau and Bekker (1992). According to this procedure, items from the full-length scale and short-form versions scale were ranked according to their corrected item-total correlation scores. Based on this parameter, the items were selected to create 12-, 9-, and 6-item short-form version of the scale; an equal number of items, in each factor of the full-length scale, were selected.

Subsequently, internal consistency of each of the four short-form versions was assessed by calculating their respective Cronbach's alpha coefficients. Pearson correlation coefficients between each of the three short-form and full-length scale were calculated to evaluate the similarity between the short-form and full-length scale. A correlation value within .9 is generally acceptable as a good indication of proportionality between scales (Fioravanti-Bastos, Cheniaux, & Landeira-Fernandez, 2011). Table IV shows the Cronbach's alpha coefficients and Full-length and Short-form Version Correlations of three Short Versions of the Scale.

Table 4 - Cronbach's alpha coefficients and Full-length and Short-form Version Correlations of three Short Versions of the Scale

Short-term Scale	Alfa de Cronbach	Pearson
Short-term version 6 Items	.828	.976
Short-term version 9 Items	.880	.987
Short-term version 12 Items	.910	.995

Factor structure of the short-form versions were evaluated by a principal axis factor analysis with varimax rotation (Fioravanti-Bastos et al., 2011). The number of factors was determined based on the number of eigenvalues greater than 1 and scree plot solution. The short-form version of the scale with 6 items did not provide a satisfactory solution. So we proceeded with the analysis of the short-form version with 9 items. The result was a solution of three well-defined factors as shown in Table 5, responsible for 77.4% of the total variance.

Table 5 - Principal axis factor analysis loading of the 9 scale items following Varimax Rotation

Item	I	II	III
Item 14	.808		
Item 13	.788		
Item 12	.709		
Item 4		.862	
Item 3		.858	
Item 2		.728	
Item 8			.884
Item 9			.812
Item 6			.708

Factor I explained 27,7% of the variance, with an eigenvalue of 2.18, and it incorporated the three items related to construction of IT knowledge. Factor II explained 25,5% of the variance, with an eigenvalue of 2.29, and also loaded the three items related to construction of IT Operations. Finally, Factor III was responsible for 24.22% of the variance, with an eigenvalue of 2.18, also includes three items associated with the construction of IT objects.

4.3 IT competency between different groups

Given that the aim was to compare the factors that make up the IT competency in different population groups, the function performed in the hotel and in the hotel groups was selected (Tables 6-7). The results show that managers or employees have a reasonable level of IT competency (mean values between 4 and 5). However, there are significant differences in the three factors ($p < 0.05$), because managers have a better average, meaning that the IT competency level is higher for managers than for employees. In addition, factors II and III have a lower mean level than the factor I. This fact makes known that, from the hotel staffs' point of view, the IT objects they have are suitable for work, and are, even better, for managers. However, the way these objects are used and how many people who use them know about IT objects could be improved.

Table 6: Mean scores comparison of IT competency scale according to the function at the hotel.

IT Factors	Function in Hotel	N	Mean	Std. deviation	t test
Objects	Manager	94	5.70	1.04	$t_{(214)} = 3.886$; $p = 0.000$
	employee	122	5.10	1.19	
knowledge	Manager	94	5.10	.97	$t_{(213.604)} = 2.262$; $p = 0.025$
	employee	122	4.76	1.21	
Operations	Manager	94	5.20	.98	$t_{(213.770)} = 2.226$; $p = 0.027$
	employee	122	4.87	1.23	

The differences between the two hotel groups were also assessed. It appears that hotel group 1 has better IT objects than group 2. However, the two groups showed no significant differences in the other two factors. The mean values for the three factors that make up the IT competency surround value 5. This also means that there is need for improvement.

Table 7: Mean scores comparison of IT competency scale according between hotel groups.

IT Factors	Hotel Group	N	Mean	Std. deviation	t test
Objects	Group 1	110	5.70	.98	$t_{(199.649)} = 4.537$; $p = 0.000$
	Group 2	106	5.00	1.24	
knowledge	Group 1	110	4.99	1.01	$t_{(204.015)} = 1.092$; $p = 0.276$
	Group 2	106	4.82	1.22	
Operations	Group 1	110	5.05	1.10	$t_{(214)} = 0.516$; $p = 0.607$
	Group 2	106	4.97	1.18	

5. Discussion and Conclusions

The outcome of the study is the validation of an instrument, which could assess the information technology in the hospitality industry. Initially, a translation of the instrument, developed by Tippins and Sohi, (2003), into Portuguese and adapted to the hotel industry was performed. The content of the instrument was validated by experts and via a pilot study with employees from 10 hotels. In a second time, an EFA was performed and a solution with thirteen items, distributed in three factors, was presented. The obtained results substantially support the reliability of the scale. The factors' designations follow the original scale: IT Objects, IT Operations and IT knowledge.

In a third step, it was developed and validated short-form version of the scale. This revealed that the scale could be reduced to nine items without compromising its psychometric properties. The short-form scale with 9-items had an adequate internal consistent coefficient. It also had a well-defined factor structure with three factors belonging to the IT competency, as in the scale of 13-items, but now with only three items in each factor.

The reduction of the instrument to 9-items, preserving its psychometric properties, is a valuable tool. Hence, is an important tool as an alternative to the complete instrument, because the short form of scales tends to reduce bias answers, more likely to occur with long and lengthy scales. In addition, short forms are much easier to use, especially in research that works the relationship between variables, or with a small number of respondents (Fioravanti-Bastos et al., 2011).

In addition to this, the original scale was used in a sample composed only by managers of large companies. In this study, the scale was performed with managers and employees, bringing to this area a different perspective in terms of different organizational actors. This allowed a more comprehensive view of IT competency.

In respect of the differences of IT competency between managers and employees the results clearly show that there are significant dissimilarities. IT competency is better for managers than for employees. Managers are more satisfied with the kind of IT objects they use than employees. They use them more efficiently; they have more knowledge, and know how to use them better in their working processes, than employees do. This probably relates to the characteristics of the industry, especially the high turnover of employees and limited development opportunities. This might hinder the assimilation of the existing IT, in terms of knowledge and good use to extract better results of the work.

Comparing the two hotel groups, regarding the use of IT objects, the results showed that group 1 has a significantly higher mean than group 2. In two other factors significant differences were not identified. The average use of technology in the management processes and the knowledge mean about the technology, used in hotels, is common for the two groups.

As proposed by Law et al. (2013), the hotel industry has utilised various technological to develop better customer relationships and to meet an increasingly demanding market. However, how technologies are used to manage the information within the company and how the organizational actors dominate, as working tools, are still far from reaching full capacity. The mean knowledge of professionals, especially of employees, is probably signalling that they need more information and education/training, in respect of to use existing technologies and to increase the IT competency.

Overall, to understand that the mean values of IT competency in hotels, in Brazil and Portugal, are around the value five, in an increasing scale of 1 to 7, is important. Mainly because it reveals that

its use - as a strategic tool used to support business operations and management decision (Ham, Kim & Jeong, 2005; Melián-González & Bulchand-Gidumal, 2016) - has not yet reached full capacity. It is important to keep in mind that hotels that possess higher levels of IT competency will be those that managed to differentiate from the others and to create competitive advantage.

The results contribute to the literature, on the topic, because they deliver a valid scale of IT to the hospitality industry, allowing a reflection on the complexity of the concept of IT. Another contribution of this study is a valid Portuguese version of the scale.

It is believed that the scale presented here can be used in future theoretical tests on the hospitality industry, which aim to determine the influence of IT on organizational variables, such as organizational performance. In practical terms, the scale developed here is able to identify the weak dimensions related to the IT environment, and support managers with information on the effectiveness of the adopted IT, about how it is being used and if professionals are able to use them properly. Thus, managers could develop strategies to improve them.

Although the study presented a simplified tool for measuring IT in the hospitality industry, it is recognized that there are some limitations that could be addressed in future research. An example of this is the need of validation by a confirmatory factor analysis in order to refine further results derived from this study. Another topic is the fact that the sample was made up only of companies in the hotel industry, and since the hospitality industry is constituted of a wide range of service industries including hotels, food service, casinos, clubs and companies events and tourism (Brotherton & Wood, 2008), a more comprehensive study may yield more accurate results.

Acknowledgments
The author of this study thanks to the managers of hotel groups involved by providing key information to the materialization of this work and the CAPES support for its realization.

References

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*.
Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, *25*(24), 3186–3191. doi:10.1097/00007632-200012150-00014
Bharadwaj, A. S. (2000). A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation. *MIS Quarterly*, *24*(1), 169–196. doi:10.2307/3250983
Brotherton, B., & Wood, R. T. C. (2008). The nature and meanings of “hospitality.” In *The Sage Handbook of Hospitality Management* (pp. 37 – 62). London, UK: Sage.
Bulchand-Gidumal, J., & Melián-González, S. (2011). Maximizing the positive influence of IT for improving organizational performance. *The Journal of Strategic Information Systems*, *20*(4), 461–478. doi:10.1016/j.jsis.2011.09.004
Dawson, M., Abbott, J., & Shoemaker, S. (2011). The Hospitality Culture Scale: A measure organizational culture and personal attributes. *International Journal of Hospitality Management*, *30*(2), 290–300. doi:10.1016/j.ijhm.2010.10.002
Deloitte. (2015). Atlas da hotelaria 2014. Lisboa: Delloite Consultores S.A.
Deng, W.-J. (2011). Development of the Hospitality Quality Management Culture Scale: A Pilot Study. *The Business Review, Cambridge*, *18*, 205–211.
Dewett, T., & Jones, G. R. (2001). The role of information technology in the organization: A review, model, and assessment. *Journal of Management*, *27*(3), 313–346.
Dodgson, M., Gann, D. M., & Phillips, N. (2013). Organizational Learning and the Technology of Foolishness : The Case of Virtual Worlds at IBM. *Organization Science*, *7039*(Arvanitis 2006), 1–19.
Dos Santos, B. L., & Peffers, K. (1995). Rewards to Investors in Innovative Information Technology Applications: First Movers and Early Followers in ATMs. *Organization Science*. doi:10.1287/orsc.6.3.241
Fioravanti-Bastos, A. C. M., Cheniaux, E., & Landeira-Fernandez, J. (2011). Development and validation of a short-form version of the Brazilian state-trait anxiety inventory. *Psicologia: Reflexão E Crítica*, *24*(3), 485–494. doi:10.1590/S0102-79722011000300009
Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis*. *vectors*.

doi:10.1016/j.ijpharm.2011.02.019
Ham, S., Kim, W. G., & Jeong, S. (2005). Effect of information technology on performance in upscale hotels. *International Journal of Hospitality Management*, *24*(2), 281–294. doi:10.1016/j.ijhm.2004.06.010
Iyengar, K., Sweeney, J. R., & Montealegre, R. (2015). Information technology use as a learning mechanism: the impact of IT use on knowledge transfer effectiveness, absorptive capacity, and franchisee performance. *MIS Quarterly*, *39*(3), 615–641.
Kokt, D., & Ramarumo, R. (2015). Impact of organisational culture on job stress and burnout in graded accommodation establishments in the Free State province, South Africa. *International Journal of Contemporary Hospitality Management*, *27*(6), 1198–1213.
Law, R., Leung, D., Au, N., & Lee, H. A. (2013). Progress and Development of Information Technology in the Hospitality Industry: Evidence from Cornell Hospitality Quarterly. *Cornell Hospitality Quarterly*, *54*(1), 10–24. doi:10.1177/1938965512453199
Marteau, T. M., & Bekker, H. (1992). The development of a 6-item short-form of the state scale of the Spielberger State Trait Anxiety Inventory (STAI). *British Journal of Clinical Psychology*, *31*, 301–306. Retrieved from <Go to ISI>://WOS:A1992JP92600004
Melián-González, S., & Bulchand-Gidumal, J. (2016). A model that connects information technology and hotel performance. *Tourism Management*, *53*, 30–37. doi:10.1016/j.tourman.2015.09.005
Nunnally, J. C., & Bernstein, I. (1994). Psychometric Theory. *Rdsepiucsforg*.
Parente, S. T., Ph, D., & Horn, R. L. Van. (2007). Valuing Hospital Investment in Information Technology : Does Governance Make a Difference ?, *28*(2), 31–44.
Powell, T. C., & Dent-Micallef, A. (1997). Information Technology as Competitive Advantage: the role of human, business, and technology resources. *Strategic Management Journal*, *18*(5), 375–405.
Rau, D., & Haerem, T. (2009). Applying an organizational learning perspective to new technology deployment by technological gatekeepers: A theoretical model and key issues for future research. *Information Systems Frontiers*, *12*(3), 287–297. doi:10.1007/s10796-009-9194-8
Real, J. C., Leal, A., & Roldán, J. L. (2006). Information technology as a determinant of organizational learning and technological distinctive competencies. *Industrial Marketing Management*, *35*(4), 505–521.
Rogerson, J. M., & Kotze, N. (2011). Market segmentation and the changing South African hotel industry (1990 to 2010). *African Journal of Business Management*, *5*(35), 13523–13533. doi:10.5897/AJBMX11.030
Solow, R. M. (1987). We'd Better Watch Out. *New York Times Book Review*, 36.
Tippins, M. J., & Sohi, R. S. (2003). IT competency and firm performance: is organizational learning a missing link? *Strategic Management Journal*, *24*(8), 745–761. doi:10.1002/smj.337