

A comparative Analysis of Visitor Satisfaction in the Digital Museum

Uma Análise Comparativa da Satisfação do Visitante no Museu Digital

Qiong Dang

PhD in Media and Communication Studies from Vrije Universiteit Brussel, Belgium and a member of the research Centre 'Culture Emancipation, Media & Society (CEMESO)'. Her research focuses on Cultural Industries, Digital Communication and Audiences. Her Ph.D research focused on Chinese cultural policy concerning museums, the digitalization of Chinese museums and visitors studies. The qualitative and quantitative methodology was applied in her research. Her Master degree is in Journalism. Her research is about Cultural and Creative Industries in Henan Province in the School of Journalism and Communication at Zhengzhou University in Henan Province, China. E-mail: qiong.dang@vub.be.

Katia Segers

PhD in Media and Communication from Vrije Universiteit Brussel, Belgium, Professor in Media Studies; Co-director of the research Centre 'Culture Emancipation, Media & Society' (CEMESO), Vrije Universiteit Brussel. Her research focuses on the Cultural and Creative Industries, Art Management and Media Policy. She is the former president of the Flemish Regulator for the Media and of the Advisory Board to the Minister of Cultural Policy. She is Member of the Scientific Committee of the International Conference on Arts and Cultural Management (AIMAC) and Member of the Flemish Parliament and the Belgian Senate, the President of the Flemish Regulator for the Media. E-mail: katia.segers@vub.be.

Abstract:

The construction of a digital museum is complex as it is influenced by various variables. Previous research has suggested that application of technology promotes cultural relics preservation, management of digitalization, effective traditional knowledge dissemination and critical thinking on museums. However, the study on the relationship between museum websites and visitors seems to be lacking. This research aims to fulfil the gap based on two cases: the Palace Museum and the Henan Museum. The data was collected from 17 in-depth interviewees and 557 questionnaires. The results show that the significant factors influencing the visitor satisfaction of museum websites are information quality, system quality, perceived usefulness, perceived usability and museum image.

Keywords:

Visitor satisfaction; Museum website; Digital Museum; the Palace Museum; the Henan Museum.

Resumo:

A construção de um museu digital é complexa e é influenciada por inúmeras variáveis. Pesquisas anteriores sugeriram que a aplicação da tecnologia promove a preservação de relíquias culturais, o gerenciamento da digitalização, a disseminação eficaz do conhecimento tradicional e o pensamento crítico em museus. No entanto, o estudo sobre a relação entre sites de museu e visitantes parece estar faltando. Esta pesquisa visa preencher a lacuna baseada em dois casos: o Museu do Palácio e o Museu Henan. Os dados foram coletados de 17 entrevistados em profundidade e 557 questionários. Os resultados mostram que os fatores significativos que influenciam a satisfação do

visitante nos sites dos museus são: qualidade da informação, qualidade do sistema, utilidade percebida, usabilidade percebida e imagem do museu.

Palavras-chave:

Satisfação do Visitante; Site do Museu; Museu Digital, Museu do Palácio, Museu Henan.

1 Introduction

Digital technology and new forms of media have been thought of as key factors in shaping and informing our modes of communication (Chen and Zhu, 2004, Parry, 2007). Furthermore, the internet has become a place for participation, collaboration, and social exchange (Lopez et al., 2011). One of the most important and significant current discussions currently going on in the museum field is how to embrace digital technology in the dissemination of culture in order to create a “Smart City” in China (Li and Cheng, 2014). Recently, researchers have demonstrated that museum curators have been becoming more interested in the potential of ‘the digital museum’ to reach and engage with new audiences (Srinivasan, 1985; Bowen et al. 2008). Previous studies have already indicated that museums utilize new technologies so as to create a diverse variety of ways to organize, catalog, and disseminate its collections (Parry, 2007; Pavlou, 2012). Under these circumstances, museum websites are increasingly being established so as to effectively address the same responsibilities as museums.

Therefore, the problem of how to increase the effectiveness of museum websites is becoming a crucial one. In marketing literature, it is significantly important that museums keep their visitors satisfied in order to build up the loyalty of their visitors, leading to the final goal of sustained profitability (Patterson et al., 1996; Patterson et al. 1997; Mckinney, 2002). With regard to the museum website, it is also of great importance to have a better understanding of the extent to which certain factors influence visitor satisfaction (Mchinney, 2002), because it is critical to attract more people to visit the physical museum (Zhang and Song, 2014). Moreover, there is some evidence to imply that end-user satisfaction is regarded as an important factor for

evaluating the effectiveness of information systems (Ives and Olson, 1984; Doll and Torkzadeh, 1994; Seddon, 1997; Negash, 2002; Xie and Li, 2013; Wang, 2016). However, in the current literature, the research on examining which factors affect museum websites is limited in China. Furthermore, there is insufficient data available concerning the extent to which the factors geared towards visitor satisfaction in China influence the museum websites there. Based on the above, this study aims to identify which factors predict the effectiveness of a museum website via satisfaction.

2 Problem statement

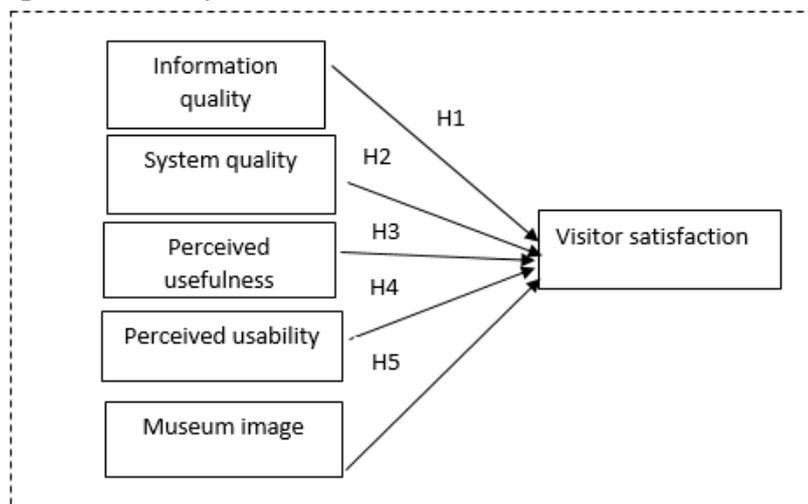
This study aims to examine which factors should be considered when museum curators establish and develop a digital museum in practice in addition to providing new theoretical insights on the understanding of Chinese digital museums for future research. Therefore, the main research question of this study is to what extent do certain factors influence visitor satisfaction when visiting museum websites in China? For this purpose, the websites of the Palace Museum and the Henan Museum have been selected as the case studies. This is due to two key reasons: first, the establishment of these two museum websites signified that museums in China had entered into a digital era, and are representative of Chinese museums; Second, they belong to the national collection of comprehensive and state-owned museums.

3 Theoretical framework

Satisfaction was initially proposed as a part of marketing research in order to measure how a company provides products or services to content its costumer's expectation (SCSB, 1989). Oliver (2014) considers that "satisfaction is believed to influence attitude change and purchase intention" (p.460), and Farris et at. (2010) states that consumer purchase intention and loyalty are predicted by customer satisfaction. In the literature, numerous studies have demonstrated that satisfaction is

introduced into various fields, including the domain of information systems (DeLone and McLean,1992). In the virtual environment, e-satisfaction was defined as “the contentment of the customer with respect to his or her prior purchasing experience with a given electronic commerce firm” (Anderson and Srinivasa, 2003, p.125). This study defines satisfaction in an online website-based context as a psychological state that represents a visitors’ expectations and assessment after visiting a museum’s website. Aiming to identify what can satisfy visitors of museum websites, the conceptual model (See figure 1) is established primarily based on the technology acceptance model (TAM) (Davis, 1989), the information system (IS) success model (DeLone and McLean,1992) and the customer satisfaction model (ECSI, 1998). There are five variables selected to predict visitor satisfaction: information quality, system quality, perceived usefulness, perceived usability, and museum image.

Figure 1: the conceptual model of visitor satisfaction of the museum website (adopted by author)



4 Research hypothesis

DeLone and Mclean (2002) clarify that information quality and system quality are two key predictors for evaluating the effectiveness of an information system (IS). In the IS model, it is widely accepted that in this context quality is representative of visitors’ factual perception of the quality of the online products or services offered by

an information system (e.g. a museum's website), including online products or services, perceived special services, online service functions, and integrated quality, which is different from product quality in the physical world. (Bitner, 1991; Dang 2016, Tian 2016, Al-Qeisi, 2014) In the literature, Pitt et al. (1995) introduce the IS model in a customer service setting through the appendage of a service quality element meant to test how IS' influence user satisfaction. Numerous studies have indicated that end-user satisfaction is believed to be the principal factor for achieving successful IS implementation (Au, et al., 2008). An empirical study in Web-based customer support systems by Negash (2002) empirically confirmed a positive association between information quality, system quality, and user satisfaction. In addition, McKinney et al. (2002) draw on the IS model to indirectly identify that web-customer satisfaction has a correlation with information quality and system quality. Thus, on account of the above literature, the following hypotheses are proposed:

- Hypothesis 1: Information quality has a positive impact on visitor satisfaction.
- Hypothesis 2: System quality has a positive effect on the visitor satisfaction.

Davis (1989) formulated the Technology Acceptance Model (TAM) in order to ascertain how to apply the information technology, and it has been shown that perceived usefulness and perceived usability are regarded as the two most significant predictors for determining the adoption of information technology. Perceived usefulness is "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p. 320) and perceived usability is "the degree to which a person believes that using a particular system would be free of effort" (ibis). In the museum website context, it is a widely held view that perceived usefulness means the public perception of how museum websites improve the quality of visitor's work, life, and learning (Taylor and Baker 1994, Negash 2002, Kim and Stoel, 2004, Bowen and Filippini-Fantoni 2004, Pavlou 2012), while perceived usability means visitors have a feeling that they can access and use a museum's website easily (Casalo et al. 2008, Li and Song, 2011, 2013, Al-Qeisi et al. 2014). It is believed that if visitors perceived the usefulness and usability of an IS, they will have a higher inclination to utilize it (Gefen and Straub, 2000). In addition, some of the empirical research has also identified that perceived usefulness and perceived

usability have a positive correlation with visitor satisfaction, and further contribute to continued intentions to repurchase and revisit (Taylor and Baker 1994, Negash 2002, Kim and Stoel, 2004, Bowen and Filippini-Fantoni 2004, Bai et al. 2008; Pavlou 2012).

Based on the above literature, this study proposes two further hypotheses:

- Hypothesis 3: Perceived usefulness positively affects visitor satisfaction.
- Hypothesis 4: Perceived usability has a positive influence on visitor satisfaction.

The European customer satisfaction model (ECSM) takes the image of an antecedent of customer satisfaction, and the image undergoing this study involves a company's overall image as well as its products or brand awareness, which is connected to customer expectation and perception (ECSM,1998). Museums as a brand emerged in 2000 (Caldwell, 2000), and a considerable amount of literature has indicated that increasing the brand awareness of a museum is a key method for achieving sustainable competitive advantages (Trant, et al., 2000; Harrison and Shaw, 2004; Moreno Gil and Ritchie, 2009; Ciocca, et al., 2012). Yi (2012) confirms that the tourist perception of the image of the destination of Hubei determines satisfaction. Similarly, empirical research conducted by Lai (2014) further depicts the image of rural tourism in Chengdu has a positive association with tourist satisfaction. In addition, some research has already demonstrated that a museum's image has a positive impact on customer satisfaction (Wallin Andreassen and Lindestad, 1998; Nguyen 2001). Thus, the study proposes that:

- Hypothesis 5: Museum image has a positive effect on visitor satisfaction.

5 Method

The hypothesized research model has been created in order to empirically test which factors influence visitor satisfaction for the websites of the Palace Museum and the Henan Museum. The 24-item questionnaire (See appendix 1) was developed and modified based on the interview and pre-validated scales in order to guarantee content

validity. Two procedures were performed in order to refine the questionnaire items so as to ensure improved accuracy of the measurements. Firstly, before the design of the questionnaire, in-depth interviews were conducted with the director of the Department of IT, Imaging, and Digital Media at the Palace Museum and the director of the IT management department at the Henan Museum, respectively, in addition to another 15 museum professionals who were also interviewed. They had asked for the interviews to be anonymous and suggested that when developing and maintaining museum websites, more attention must be paid to its content, quality, and practicality, as well as the external factor of museum image. Second, on account of the interview and the previous research, while 24 items were proposed and written in English, because the exploratory study was conducted in China these items were translated into Chinese. The questionnaire consists of three parts. In the first part, demographic scales are used to gather basic data, including gender, age, and level of education. The second part contains 24 items divided into six sections to measure the Palace Museum's website. In the third part, the same 24 items were asked in regards to the Henan museum's website. The five-point Likert scale was applied to examine visitor satisfaction ranging from strongly disagree (1) to neutral (3) to strongly agree (5). The constructs and sources of items are displayed as follows:

- Information quality: four items adopted from Katerattanakul and Siau (1999), Lee (2006), Li and Song (2012, 2013), Abasi and Hafashjani (2015);
- System quality: four items modified from Katerattanakul and Siau (1999), Lee (2006), Li and Song (2013), and Abasi and Hafashjani (2015);
- Perceived usefulness: four items adopted from McKinney et al. (2002); Li and Song (2013, 2013);
- Perceived usability: five items from Davis et al. (1989), Gefen and Straub (2000), McKinney et al. (2002), and Li and Song (2012, 2013);
- Museum image: four items modified from Nagash et al. (2003), Walzl (2006), Sondoh et al (2007), Wang et al. (2012) and Zhang and Shao (2015);
- Visitor satisfaction: three items modified from Walzl (2006), Negash et al (2003), Fornell et al. (1996), Teather and Wilhelm (1999), Bowen et al. (2004), Akama and Kieti (2003).

6 Data collection procedures

As the websites of the Palace Museum and the Henan Museum were the two cases under study, an online survey was created aiming to collect empirical data. The links between the Palace Museum and the Henan Museum were arranged in the first part of the questionnaire, and participants who had not visited them before were required to visit them first before completing the survey in order to guarantee the survey's authenticity. The 24-item questionnaire was distributed at random from 24th September 2017 to 25th December 2017 through Chinese social media, such as on Wechat, QQ, blogs, etc. A total of 557 questionnaires were returned and the SPSS 20.0 software was applied in order to analyze the collected data.

7 Results

7.1 Demographics of respondents

557 persons (see table 1) participated and submitted their results in this study, of which 224 were male (40.2%) and 333 were female (59.8%), for visiting the Palace Museum website and the Henan Museum website. Most of these respondents (73.6%) were between 31-40 years old, and the participants above 60 years and between 51-60 years old only represented 0.4 % (2) and 0.9 % (5), with the number of those under 18 years old at 27 (4.8 %). The respondents between 41-50 and 51-60 years old represented 93 (16.7%) and 20 (3.6%) respectively. It is thus evident that younger respondents were inclined to appreciate the museums' websites. In terms of level of education, those with a bachelor's or master's degree, or above, accounted for 40.6% (226) and 37.2% (207) respectively, with the proportion of people with higher education was larger than the remaining two. In summary, females, the youth, and those with higher education are more inclined to visit the two museums' websites.

Table 1: Sample profile of the survey

| Item | Demographic | Frequency | Percentage (%) |
|---|--------------------|-----------------------|----------------|
| Gender | Male | 224 | 40.2 |
| | Female | 333 | 59.8 |
| Age | Under 18 | 27 | 4.8 |
| | 18~30 | 410 | 73.6 |
| | 31~40 | 93 | 16.7 |
| | 41~50 | 20 | 3.6 |
| | 51~60 | 5 | 0.9 |
| | Above 60 | 2 | 0.4 |
| | Level of education | High school and under | 30 |
| Higher vocational and specialized education | | 94 | 16.9 |
| Bachelor | | 226 | 40.6 |
| Master and above | | 207 | 37.2 |

Table 2: the reliability and validity of the measure model

| The Palace Museum | Construct | Cronbach's Alpha | KOM | Sig. | The Henan Museum | Construct | Cronbach's Alpha | KOM | Sig. | Item |
|-------------------|-----------|------------------|------|------|------------------|-----------|------------------|------|------|------|
| | IQ | .912 | .850 | .000 | | IQ | .942 | .860 | .000 | 4 |
| | SQ | .929 | .855 | .000 | | SQ | .994 | .861 | .000 | 4 |
| | PUF | .938 | .863 | .000 | | PUF | .962 | .870 | .000 | 4 |
| | PUB | .948 | .905 | .000 | | PUB | .937 | .913 | .000 | 5 |
| | MI | .907 | .838 | .000 | | MI | .946 | .842 | .000 | 4 |
| | VS | .941 | .767 | .000 | | VS | .947 | .769 | .000 | 3 |
| Total | | .987 | | | | | .990 | | | 24 |
| Total | | | .986 | .000 | | | | .984 | .000 | 24 |

Tavakol and Dennick (2011) state that “validity and reliability are two fundamental elements in the evaluation of a measurement instrument” (P77). In regards to the Palace Museum, the Cronbach's Alpha of each construct (see table 2) was larger than 0.70 and ranged from 0.907 (visitor satisfaction) to 0.987 (information quality). In terms of validity, the KMO and Bartlett's Test value of each construct was larger than 0.7 (Bland and Altman, 1997; Wu, 2003), and the p-value was less 0.001, which illustrates that the validity was satisfactory. In terms of the Henan Museum, the Cronbach's Alpha ranged from 0.937 (perceived usefulness) to 0.994 (system quality), and the KMO and Bartlett's Test value of each construct was greater than 0.7 (P<0.001), which illustrates that they had a high level of reliability and validity. In summary, the results demonstrated that the Cronbach’s Alpha of the Palace Museum’s and the Henan Museum’s websites was 0.986 and 0.990 respectively, which was larger than the recommended 0.7 level and indicates that the data had a high level of

reliability and all the p-values were less than 0.001, which implied that the data had a high validity. The measurement model was satisfactory.

7.2 Hypothesis verification

Aiming to explore the research question, the multiple linear regression was conducted so as to check whether visitor satisfaction is positively and directly influenced by the hypothesized factors. With respect to the Palace Museum, the results (see table 3) indicated that the regression model was a good fit for the data ($R^2=0.925$, $P<0.001$). Because the p-value is greater than 0.05, there was no significant positive correlation between the information quality and visitor satisfaction, and as such Hypothesis 1 was not significant. Except for the first hypothesis, all the remaining p-values were smaller than 0.001, which indicated that the hypothesized associations were strongly and statistically significant. Consistent with our predictions, the system quality of a museum's website was demonstrated to be a direct and positive factor for predicting visitor satisfaction ($P<0.001$). The P-value was less than 0.001, which implied that visitor satisfaction was positively predicted by perceived usefulness. Moreover, perceived usability was found to have a positive influence on visitor satisfaction, confirming hypothesis 4. A museum's image had a positive association with visitor satisfaction ($P<0.001$), confirming hypothesis 4 as well. The significant positive direct impact of a museum's image on visitor satisfaction corroborates the current research (Fan and Chen,2002). This finding suggests that improving a museum's reputation is a driving force for compelling more people to learn about it and visit it (Long and Gan, 2011). In summary, except for information quality, the other four factors turned out to positively affect visitor satisfaction.

In terms of the Henan Museum, the data was found to be satisfactory ($R^2=0.924$, $P<0.001$). The results of the multiple linear regression are illustrated in table 3. The table demonstrated that the four hypothesized associations were strongly significant due to $p<0.001$, and that hypothesis 2 was not significant ($P>0.05$), which indicated that system quality does not have a positive and direct effect on visitor satisfaction. Consistent with H1 and H5, information quality and museum image were

found to have a positive impact on visitor satisfaction at $p < 0.001$. In regards to perceived usefulness and perceived usability, both P values were less than 0.001, confirming H3 and H4. In summary, the results demonstrated that information quality, perceived usefulness, perceived usability, and museum image had a positive and direct association with visitor satisfaction. However, there is no positive association with system quality and visitor satisfaction.

Table 3. Regression of IQ, SQ, PUF, PUB, and MI towards VS

| Model | The Palace Museum | | | | The Henan Museum | | | | |
|-------------------|-----------------------------|------------|---------------------------|----------|-----------------------------|------------|---------------------------|----------|----------|
| | Unstandardized Coefficients | | Standardized Coefficients | t | Unstandardized Coefficients | | Standardized Coefficients | t | |
| | B | Std. Error | Beta | | B | Std. Error | Beta | | |
| (Constant) | -.034 | .048 | | -.002 | .040 | .046 | | .874 | |
| IQ | .002 | .041 | .002 | .053 | .124 | .048 | .123 | 2.604*** | |
| SQ | .198 | .038 | .194 | 5.146*** | .078 | .050 | .076 | 1.554 | |
| PUF | .374 | .041 | .374 | 9.112*** | .380 | .050 | .373 | 7.669*** | |
| PUB | .273 | .042 | .262 | 6.565*** | .227 | .051 | .222 | 4.496*** | |
| MI | .164 | .033 | .159 | 4.945*** | .189 | .038 | .189 | 4.949*** | |
| R Square | | | | | | | | | .925 |
| Adjusted R Square | | | | | | | | | .923 |
| F*** | | | | | | | | | 1367.340 |
| | | | | | | | | | 1330.450 |

Note: Dependent variable: VS Significant at $P^{***} < 0.001$, $P^{**} < 0.05$

7.3 Discussions and managerial implication

This study had several findings and managerial implications. First, there is an interesting finding that visitor satisfaction is not positively influenced by the quality of information in regards to the Palace Museum website, whereas it positively affects visitor satisfaction for the Henan Museum website. In addition, system quality is not a determinant of visitor satisfaction in terms of the Henan Museum website, but it is a positive predictor of visitor satisfaction of the Palace Museum website. The results are partly in contrast to earlier studies which indicated that both factors have an influence on visitor satisfaction (McKinney et al, 2002, Li and Song, 2013). To a larger extent, the findings indicate that the application and innovation of new technology should be encouraged within the museum field so as to provide visitors with multiple experiences: "aesthetic and emotional delight, celebration and learning, recreation and

sociability" in order to facilitate engagement of visitors (Kotler, 1998, P.39). Second, another prominent aspect of the results was that their perceived usefulness and perceived usability had a direct, positive impact on visitor satisfaction with respect to both museum websites, which is consistent with previous studies (Taylor and Todd 1995; Bhattacharjee, 2001; Li and Song, 2013). It has been demonstrated that when museum curators develop the museum's website, it is essential that they recognize that visitors' perceptions are critical for facilitating said website's development, and therefore visitor-centered strategies should be formulated so as to provide valuable and effective information to meet the visitors' requirements and to strengthen engagement (Davidson, 2015). Third, there is a positive correlation between museum image and visitor satisfaction in terms of the two museum websites. This result was confirmed by the earlier studies (Sondoh et al.; 2007). A previous study involving museums and visitor satisfaction also reported that a museum's reputation and its brand were the two most important factors when it came to satisfying visitors (Del Chiappa, et al., 2014). Therefore, even though a museum's reputation is classified as an external factor, it is critical for museum curators to take the museum's reputation into consideration when creating a distinctive brand image.

In summary, it is believed that "investing in customer satisfaction is like taking out an insurance policy. If some temporary hardship befalls the firm, customers will be more likely to remain loyal" (Anderson and Sullivan 1993, p. 140). Therefore, it is crucially important for museum curators to explore the extent to which these aforementioned factors influence visitor satisfaction. In this study, the results imply that visitor satisfaction is positively affected by the quality of the website, visitor perception, and museum reputation. This finding is applicable for museum curators in order to perfect the development of a museum's website so as to provide visitors with an excellent virtual experience so as to enhance visitor engagement (Marty, 2008).

5 Conclusions

This research study may be the first attempt to conduct exploratory research in order to explore the influence of information quality, system quality, perceived

usefulness, perceived usability, and a museum's image on visitor satisfaction in regards to digital museums in China. Therefore, certain theoretical insights have been presented for future researchers so that they may obtain a better understanding of this topic. This study appends new empirical results to the argument of prior studies in that the five factors should be considered in the construction of a digital museum. However, two prominent limitations exist. First, this research is not complete because the reasons why information quality and system quality had different influences on the websites of both museums had not been explained. Second, this study was conducted in a Chinese context, and therefore the findings may not be suitable for extrapolation for other countries. Finally, this research highlights the importance of technological and social factors in addition to individual cognition for the development of a digital museum (Chen and Zhu, 2004), and fills the research gap between visitor satisfaction and museum websites. Research on visitor satisfaction towards museum websites can enable researchers and practitioners to obtain a better understanding of digital museums and lead to effective, innovative practices in the museum context in China.

Acknowledge

Many thanks for the interviewees and all the respondents in this research.

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Recebido em: 20/09/2019

Aceito em: 25/10/2019