

Designing a mobile app for museums according to the drivers of visitor satisfactionⁱ

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Abstract: The aim of this study is to identify the key factors as antecedents of visitor satisfaction for the design of a mobile app for museums. To our aim we use the Kano model that allows to categorize service attributes according to how they are perceived by customers and to estimate their impact on customer satisfaction. We collected qualitative data through 300 questionnaires administered to tourists visiting the Sicilian cities of Palermo and Trapani over a period of 3 months (October- December 2012). The results of our analysis can be relevant for museum and public managers to plan strategic and operative activities, for researcher in the field of touristic marketing, for application developers, and for all those concerned with touristic and cultural heritage issues.

Key-Words: Museum Marketing, Mobile App, Mobile Tourism, Mobile App Marketing, Kano Model, Customer Satisfaction, Cultural Tourism, Museum Technology.

1 Introduction

In spite of the global economic crisis, the mobile internet devices sector (including smartphones, tablet and similar hybrids) is among the few sectors experiencing a continuous and fast growth.

At a global level we have today about 1.5 millions of mobile apps, 500,000 tablets' apps and over 60 billions of mobile apps downloaded by smartphones and tablets [1]. In the United States about 119.3 million people (51% of mobile phone users) own a smartphone [2]. In Italy, according to estimates, about 32 million of smartphones, 2.5 million of Internet TV users and 2.9 million of tablet have been sold by the end of 2012. Forecasts say that in 2015 the sales of smartphones will overcome those of Personal Computers (in Italy 49 million versus 47 million) [1]. These devices are becoming a daily presence in the life of people who want to be "always connected". This represents a great opportunity for the software industry that can exploit a fast growing market, as well as for any kind of firm that can take advantage of these new

tools to get in touch and keep the relations with a growing number of customers.

The new "mobile economy" has relevant implications for Internet marketing strategies. The adoption of a mobile marketing strategy allows the organization to follow the client/user along the whole relationship cycle.

In the tourism sector this opens a wide range of opportunities to attract and gain the fidelity of visitors. "Mobile tourists" can go through a new way of travelling as "virtual tourists" for which the travelling experience is empowered by the information and entertainment coming "also" (but of course not exclusively) from their new "travel buddy": the mobile technology device.

Tourist attractions like museums must not lose this chance and need to find new ways to get the attention of this new kind of tourists, becoming "Museum 2.0".

Mobile apps have the potential to personalize the users' museum experience whenever and wherever they like, integrating collections, exhibitions and

other offerings into a much broader range of use-case scenarios than we have ever imagined.

Geo-referenced information can attract tourists inviting them to visit the closest museum and maintain the relation after the trip, thus getting more chances of repeated visits.

The challenge for these services is to be able to rapidly supply customer oriented content at low cost (or for free) following the growing expectations of customers/users. Hence, understanding the antecedents of the user experience becomes pivotal. Functional aspects are not enough to overcome the new challenges; a very good app in functional terms could result useless to reach the target. Therefore, it is necessary to design apps according to users' expectations and desires so that they can be able to establish and keep the virtual relation.

In this study we apply the Kano Model [3] to a cluster of Sicilian museum visitors in order to design a user oriented mobile app for museum.

The island of Sicily (Italy) for its geographic position, historical heritage and mild weather has a strong cultural touristic vocation that still has not been fully exploited. Sicilian museums are frequently undervalued and barely visible on the web. Mobile application technology, due to the low costs of diffusion, can enhance significantly the Sicilian museum offer, but unfortunately most of the Sicilian museums are badly managed by local government, which does not invest enough financial resources and is not able to innovate and understand the advantage of web based services. The reason why of this study is to show the potential of Sicilian cultural tourism and how it could be exploited by a more enlightened governance of the sector.

2 Theoretical background

The role of the museum has become increasingly complex in the last years.

Authors as Kotler [4] and McLean [5] stated that museum marketing should adopt a visitors-focus approach oriented to design an offer able to meet visitors' expectations. Hence, first of all, it is crucial to know which are needs and expectations of visitors and their actual level of customer satisfaction/dissatisfaction. Furthermore, museum managers should conceive the visitor experience as a way to establish a symbiotic relationship between the visitor and the cultural resource [6]. The visitor-oriented approach should, indeed, involve the visitors to participate to the design of the offer. Consumers have become more demanding, more informed and, at the same time, more willing to supply information in exchange for more

personalized products which better satisfy their desires, needs and expectations [7][8]. If the museum gives "voice" to the visitors and realizes their desires, it will probably gain a strong competitive advantage. Several studies have focused on the identification and interpretation of the most empirical elements considered as relevant by visitors [9][10][11][12][13][14][15][16][17][18].

Among these studies, Kuo et al. focused on tourists' interpretation experiences of a museum applying the Kano's model and the Importance-Performance Analysis (IPA) [18]. The authors conducted two empirical studies in Mainland China and Taiwan in order to identify service elements considered as most important by visitors. Burton et al. identified the attributes of choice in repeat museum visitation conducting a research in the two major museums of Australia [15].

However, involving the visitors in the design of the offer is not sufficient to maintain a competitive advantage over time. In order to be competitive, museums should also "*stimulate the desire to know*" [19], offering to the visitor an "info-cultural-tainment" experience, characterized by the interaction among leisure, entertainment, culture, education and socialization [20].

Towards this goal, interactive technology can represent an important tool able to reinforce and to integrate both museum marketing and communication strategies. Through the power of technology, the museum can reach a great number of virtual visitors, that could potentially become real visitors [21]. Interactive technologies can enhance the current and potential visitors' experience, allowing them to become more involved in their tour along the museum galleries [22][23].

A considerable amount of research has been done with regard to the role of interactive technology in museum management [21][22][23][24][25][26][27][28][29]. Nevertheless, there has been little research conducted specifically on the role of "*mobile applications for museums*". This is probably due to the fact that the wide diffusion of this new technology is very recent.

As Hume and Mills [23] pointed out, only few kinds of interactive technologies have currently been adopted in museums, such as internet, handhelds and touch screens [30][31][32]. However, they are optimistic about the future: "*many new and emergent technologies including social media, online storage and e-commerce are available and will advance interactive and online services in the future.*" [23].

We believe that mobile application technology is one of the main successful emergent technology and

its managerial implications could be considered a new fascinating field of study; nonetheless the marketing implications of the implementation of these technologies to museums has been scarcely covered in the literature.

With this research we aim to fill this literature gap and to stimulate some reflections about the potentiality of this new technology for museums.

3 The Kano Model

In this study we apply the model proposed in 1984 by Noriaki Kano. The main change introduced by the Kano model, compared with traditional customer satisfaction measurement methods, is the idea that not all features of a product/service have the same impact on customer satisfaction. On the basis of this assumption, the Kano model lists the attributes of a product/service in five categories, depending on the quality perceived by customers/users and the capacity to meet their expectations:

- **Must-be** (dissatisfiers or basic factors): their presence will not increase the satisfaction level significantly, while their absence will cause extreme dissatisfaction.
- **One-dimensional** (performance factors): these factors cause satisfaction when their performance is high, and dissatisfaction when their performance is low. The company should try to be competitive here.
- **Attractive** (satisfiers or excitement factors): these requirements cause customer satisfaction if delivered, while they do not cause dissatisfaction if they are not delivered. Their presence strengthens the competitive advantage of the firm because such factors increase the value of the product or service as perceived by the customer.
- **Indifferent**: the customer does not care about whether this feature is present or not.
- **Reverse**: the customer does not desire this kind of product requirement, and its presence causes a great level of dissatisfaction; its absence determines satisfaction.

The execution of measurement in the Kano Model follows four steps:

1. **Identification of the customer's needs**: it can be implemented via individual interviews or through focus-group interviews with members who already know the product or service.
2. **Development of the Kano questionnaire**: The Kano questionnaire is characterized by pairs of questions for each customer requirement: "*How would you feel if requirement X were present in*

the product or service?" (Functional form of the question), "*How would you feel if requirement X were not present in the product/service?*" (Dysfunctional form of the question). For each functional and dysfunctional question, the customer can select one of five alternative answers as expressions of different degrees of perception: 1. I like it that way; 2. It must be that way; 3. I'm neutral; 4. I can live with it that way; 5. I dislike it that way. The answers to each functional-dysfunctional question pair are cross-referenced using a matrix formulated by Kano (fig. 1), and the perceptions are thus evaluated into quality dimensions (M: must-be requirement; I: indifferent; R: reverse; O: one-dimensional; A: attractive; Q: questionable requirements).

Fig. 1 - Kano Evaluation matrix (adapted from Kano et al., 1984).

		Answers to dysfunctional question				
		1.	2.	3.	4.	5.
Answers to functional question	1.	Q	A	A	A	O
	2.	R	I	I	I	M
	3.	R	I	I	I	M
	4.	R	I	I	I	M
	5.	R	R	R	R	Q

3. Administration of interviews.

4. Interpretation and evaluation of the results.

4 The application of the Kano model to Sicilian museums

We apply the Kano Model to identify express and latent needs of cultural tourists and to design a mobile app for museum according to the ideal characteristics that better satisfy their expectations. Our research is related to the segment of visitors of Sicilian museums located in the provinces of Palermo and Trapani. We followed the four steps proposed by Noriaki Kano's model.

Prior to distributing the questionnaires to the cultural tourists, we held three focus-group interviews (groups of seven people) with people who had experience with mobile apps for museums in order to identify explicit and latent needs and expectations.

Using their answers and the debate that followed, we have been able to identify twenty expected features that we have grouped into four main areas, as shown in Table 1.

Tab. 1 - The requirements of a mobile app for museums identified by users

MUSEUM	
1.	How to get to the museum
2.	Description of the museum structure
3.	Time of opening and closing
4.	Tickets booking and/or purchasing
5.	Additional services (café, restaurant, museum shop) information
6.	Contacts
7.	Timetable of planned exhibitions, events and tours.
8.	Real-time news on new products and events
ARTWORKS	
9.	Museum artworks photo-gallery
10.	Audio-guides with detailed information about each artwork
11.	Explanatory files of the artworks
12.	3D virtual tour
13.	Virtual tour bookmarks
MAP	
14.	Museum map
15.	Suggestions for guided tours
ACCESSIBILITY AND USABILITY	
16.	Multilingual option
17.	Available off-line
18.	Friendly and efficient user interface
19.	Free download
20.	Accessible on any device (Mac, Android, and so on)

Following the identification of the requirements, we prepared the questionnaire in order to discover the nature of these requirements. Our questionnaire consisted of two parts:

- Personal information (gender, age, qualification, profession, place of origin), mobile devices ownership and experience.
- 40 questions in functional and dysfunctional form investigating the nature of the 20 requirements identified in step 1. The questions were grouped in classes to facilitate the overall comprehension of the survey.

After that, we administered 300 questionnaires to a sample of cultural tourists of Sicilian museums. The questionnaires were administered in printed form and were available in the museums receptions over a period of 3 months between October and December 2012. After a screening of the questionnaires collected, 287 (out of 300) questionnaires were considered valid (96%), of which 198 (69%) in the province of Palermo and 89 (31%) questionnaires in the province of Trapani.

The total sample consisted of people who were visitors of the selected Sicilian museums.

The sample of respondents consisted of 205 (71%) Italian guests (52 Sicilians and 153 non-Sicilian Italians) and by 82 (29%) foreigners.

As for sex distribution, 41% of the respondents were male, and 59% female. The average age of respondents was 50 years old. About the level of education in our sample 40% of respondents

declared they had a bachelor's degree, 36% had a high-school diploma, 17% had a master's degree, and 3% had a Ph.D., while 4% had a middle-school diploma. With regard to professions, 40% of the sample were employees, 17% were retirees, 28% were self-employed, 5% were students, and 10% were unemployed. 63% of the respondents owned mobile devices (smart phone and/or tablet/hybrid devices, etc.) and the 35% of them has downloaded and experienced at least one museum app.

4.1 The interpretation and evaluation of the results

The last phase in the development of the Kano Model is the interpretation and evaluation of the results. After the data collection, we proceeded to the classification of the nature of each requirement. We calculated the total number of responses for each requirement, using the Kano evaluation matrix (Fig. 1) to identify the categories according to the questionnaire responses. There are several methods to interpret and evaluate results of Kano model [33]. We have chosen the "evaluation by frequency" to identify the nature of each requirement and the "M>O>A>I rule" to interpret results of the research.

4.1.1 Evaluation by frequency

We used the "evaluation by frequency" method to determine the category of each requirement on the basis of the maximum frequency obtained, as shown in Table 2. Questionable results (Q) have very low frequencies, thus the questionnaire had a high level of reliability.

Table 2 - Classification of requirements in accordance with evaluation by frequency method.

Requirement	O	M	A	I	R	Q
How to get to the museum	80	<u>106</u>	13	54	33	1
Description of the museum	45	33	<u>139</u>	59	11	-
Time of opening and closing	<u>124</u>	67	73	19	3	1
Tickets booking and/or purchasing	<u>152</u>	63	24	23	25	-
Additional services information	69	37	<u>136</u>	43	2	-
Contacts	81	<u>143</u>	13	28	21	1
Timetable of planned exhibitions, events and tours	<u>136</u>	23	103	14	11	-
Real-time news	23	12	18	<u>178</u>	54	2
Museum artworks photo-gallery	43	<u>121</u>	19	89	15	-
Audio-guides	<u>115</u>	67	84	18	3	-
Explanatory files of the artworks	23	16	21	<u>189</u>	58	-
3D virtual tour	23	12	83	52	<u>116</u>	1
Virtual tour bookmarks	17	5	19	<u>156</u>	88	2
Museum map	46	<u>148</u>	26	43	24	-
Suggestions for guided tours	37	20	<u>164</u>	43	23	-

Multilingual option	73	<u>157</u>	15	34	7	1
Available off-line	<u>143</u>	48	43	39	14	-
Friendly and efficient user interface	48	<u>156</u>	19	62	2	-
Free download	<u>101</u>	5	80	76	23	2
Accessible on any device	57	27	<u>178</u>	22	3	-

According to the results of our study, there are 6 requirements which are considered must-be by respondents, hence their presence is mandatory. A museum smart app should always fulfill details about how to get to the museum (subway, bus, train, car, taxi), but also contacts of the museum (phone number, e-mail). Furthermore, a museum app should include a photo-gallery of the main important artworks of the museum (in this way the visitor can view in advance if the museum arouses his interest or not) and a map of the museum, with different itineraries and the location of the main artworks. The last two must-be requirements are related to the accessibility and usability of the app: an app for museum should have the multilingual option in order to allow to different tourists to use it (usually museums have a high proportion of foreign visitors) and it also should have a friendly and efficient user interface, in order to spread the app also among less experienced users. All these requirements are mandatory, so their presence is strongly recommended, otherwise they will cause high dissatisfaction levels. However their presence does not increase the level of customer satisfaction because users take them for granted.

In the study we found 6 one-dimensional requirements. The presence of these requirements increases proportionally the level of customer satisfaction, hence the museum app should hold them. The first two of them are the time of opening and closing and the possibility to book and/or purchase tickets online. They are very important requirements for people who want to plan in detail their visit to the museum. Another important requirement is the presence of an updated timetable of planned exhibitions, events and tours. This requirement allows visitors to carefully choose the day they prefer to visit the museum. One requirement that is able to increase the pleasure of the visit at the museum is the possibility to download audio-guides with detailed information about each artwork: visitors prefer to hear audio-guides in their own devices rather than renting devices used by many other people. The last two one-dimensional requirements are related to the features of accessibility and usability of the smart app. The first is the availability off-line of the app: this feature guarantee the possibility to utilize the app even if the museum does not offer a free Wi-Fi

connection. This requirement is very important for foreign tourists, which usually do not have a subscription to the Italian telephone/internet companies. The last one-dimensional requirement is the free download: people are not willing to pay to buy a museum app. On the other hand, museum represents a special form of nonprofit organizations in the service sector. Hence, the museum can recover the costs of the app increasing the price of tickets, but not through the selling of the app.

The results show that visitors have considered 4 requirements as attractive. Museums are free to decide whether to include these requirements in their apps, as their absence does not decrease the level of customer satisfaction, their presence would strongly increase it. This kind of requirements are useful to differentiate a museum app offer from that of competitors and to increase the perceived value of the app. The first attractive requirement is the description of the museum structure (on the building, on the architect who designed it, on the past history, and so on). Another attractive requirement is the list of the additional services offered in the museums - such as the presence of a café, restaurant, museum gift shop, a place for smokers, toilets – and their localization in the map.

One additional attractive requirement related to the visit is the suggestion for guided tours. The app should fulfill information about the guides, their remuneration, their specialization, their availability and the possibility to customize the visit to the museum according to the visitors' main interests. The last attractive requirement is the accessibility from any kind of devices (Mac, Android, and so on) in order to allow the use of the app by the majority of users.

Museum should not invest in fulfilling indifferent requirements because they have not any impact on customer satisfaction. We found 3 indifferent requirements. The first of them is the presence of real time news on new products, such as ongoing and planned exhibitions, announcements, events, and artworks temporarily not visible to the public. Visitors prefer to have only the complete timetable with scheduled events. The second indifferent requirement is the presence of explanatory files of the artworks which deepens the contents of audio-guides. Visitors believe that these additional contents may be excessive and may slow their visit too much. The last indifferent requirement is the possibility to put a bookmark on interesting artworks during the virtual tour. Visitors are not attracted by this requirement, maybe because it seems to be too difficult to use, or because they do

not need to use these bookmarks to remember interesting things to visit.

The only reverse requirement is the opportunity to take a virtual tour of the museum from the device. Even if this requirement could give the opportunity to everyone to visit the museum from their homes, the majority of respondents did not like this requisite for two main reasons:

1. The virtual tour could be too heavy and slow down the application.
2. Visitors think that the virtual tour might ruin the excitement of the real visit.

Respondents are adverse to the presence of this requirement, hence the museum should not include it (also because its cost is very high).

4.1.2 M>O>A>I rule

The M>O>A>I rule is a hierarchical rule of quality-category importance that can be used to design a product or service. According to that rule, the most important requirements that cannot be lacking in a product or service are the must-be requirements, then the one-dimensional ones, then the attractive ones, and least importantly, the indifferent requirements. The M>O>A>I rule can be conceived as a useful guideline for efficiently directing investments in order to design the features of a museum smart app.

By analyzing the results of the evaluation by frequency and applying the hierarchical rule of M>O>A>I, some practical indications emerge. If managers wish to design a museum app according to visitors' needs, they will first of all ensure the presence of the must-be requirements: details on how to get to the museum; contacts; museum artworks photo-gallery; museum map; multilingual option; friendly and efficient user interface.

Once that must-be requirements have been fulfilled, museum managers should then invest their financial resources to fulfill the one-dimensional requirements previously indicated: time of opening and closing; tickets booking and/or purchasing; timetable of planned exhibitions, events and tours; audio-guides with detailed information about each artwork; available off-line; free download. The presence of these features, together with the must-be requirements, is a necessary condition to ensure the sufficient level of customer satisfaction.

If additional resources are available, the museum offer could be enriched by the several attractive requirements we identified: description of the museum structure; additional services information (café, restaurant, museum shop); suggestions for guided tours; accessibility with any device (Mac, Android, Windows, etc).

Museum managers should avoid investing resources in the indifferent requirements—namely real-time news on new products; explanatory files of the artworks; virtual tour bookmarks — and must definitely avoid to waste resources to implement the reverse requirement: the 3D virtual tour.

5 Limitations of the study and further research

Even if we believe our findings are useful to supply practical suggestions for the design of a mobile app for museums, we are aware of the limitations of this research.

The main limit is that our analysis has been conducted in an underdeveloped region (Sicily is among the poorest and less developed regions in EU), where the museums offer is retarded and undervalued. This may imply that the visitors interviewed through the questionnaires in the museums had a low level of expectations, or were not used to this kind of software (in the case of Sicilian visitors). However, since our aim was to find the prerequisites to design a mobile app for museums our results may be of some interest also for museums managers and software developers located in more advanced regions.

The second limit of this study is that our sample was limited in space and time. If data could be obtained from a wider range of individuals and places, in a longer period of time, the results would have been more significant.

We aim to develop future research by analyzing museums that already implemented mobile apps, in order to point out how and if these apps create greater levels of visitors' satisfaction.

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Endnote:

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