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Online Innovation in Museums. An investigation of Austrian, Swiss and British museum websites and social media portals.

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Abstract

During the last decades, museums have changed substantially – they are more oriented towards their visitors and dependent on the market. In order to be successful and appealing to the audience, museums have realized the power of innovation, of which one crucial factor is Information and Communication Technologies (ICT). In this context, their online presence plays a decisive role. The levels of innovative adaption vary among museums, a fact that can be traced back to characteristics that impact the behavior of a museum.

With this background, the research of this thesis aims at detecting the most relevant museum characteristics that influence their innovativeness. It considers one aspect of innovation in museums, technological innovation in customer reach, and investigates the differences in the online presences of museums. By pursuing a website content analysis the researcher analyzes the websites and social media portals. This analysis focuses on three groups of types in three European countries, Austria, Switzerland and the United Kingdom, and considers four museum characteristics, namely, size, type, country and competition. In order to find an answer to the main research question, various statistical tests were conducted. The results indicate that size and country have great influence on the online presence, whereas the impact of types and competitive situation is rather week. Moreover, it stresses the considerable higher level of innovativeness of British museums and furthermore, the analysis highlights the increasing (online) power of large museums.

Keywords: Museum – Innovation – ICT – Website Content Analysis – Online Presence

Table of Contents

1 INTRODUCTION

Museums not only face fierce competition within the museum world, but also have to fight for survival within the cultural and leisure sectors in general. Particularly the transformation from a market-independent to a more commercial and dependent institution requires museum directors to rethink their strategies, keep up-to-date with market trends and offer more than just a standard visit to a museum (Anderson, 2012; Weil 1997). Although adapted on different levels, in general it can be said that many museums have evolved to provide services, which are not included in their core business. This trend of offering ancillary services, such as restaurants, cafés or shops is widespread and moreover the need to design a ”full” experience for the visitor is becoming increasingly decisive in the role of museums (Anderson, 2012; Frey & Meier, 2006). This is why directors need to be open to innovative thinking and innovation, in terms of new, outstanding and improved services. As far as museums are concerned, this is particularly true in one area, namely, the online presence of museums. Due to the increasing use of the Internet, social media platforms and online services, it is very useful and indeed crucial to reach potential and existing audiences via the web (Bakhshi & Throsby, 2010).

Information and Communication Technologies (ICT) and their diffusion are having major effects on society and are of great relevance for many industries. The numerous possibilities of the Internet and the sophisticated use of ICT can help an organization to improve and change its business, be more efficient and reach new customers (Bekar & Haswell, 2013). Although a wide variety of museums have realized the power of innovation in terms of ICTs and their innovative adaption to their sector, clear differences in their levels of progress can be found. Whereas some institutions are highly advanced, others are lagging behind. These contrasts can be traced back to the various objectives and goals of museums. Furthermore, their supply of core and ancillary services is influenced by various characteristics. Size, type, demand, country and other factors have an impact on the behavior and strategy of a museum (Anderson, 2012; Frey & Meier, 2006; Newhouse, 1998). The change in demand with an audience that expects to be entertained and experience more than just the traditional features of a museum, the general attitudes of countries towards development and innovation, the (financial) differences as well as the behavior of small and large museums clearly affect their management and its achievements.

This interface between the traditional and modern role of museums, their competitive situations and the importance of innovation and technology provides the starting base of this

thesis. It wants to further investigate the development of the role of ICTs for museums, their levels of adoption regarding new and innovative technologies, further consequences connected to these internal and external changes and the characteristics that are most determining and influential concerning their innovative behavior.

Therefore, with regard to the theoretical starting points and topics of interest that are presented above the main research question of this thesis is:

Which characteristics impact the online presence of museums in terms of innovative ICT usage? An investigation of Austrian, Swiss and British museum websites and social media portals.

1.1 MOTIVATION

The motivation of this thesis is to find an answer to the central research question and to four hypotheses, or to be more precise, the aim is to explain the innovativeness of museums by the means of certain influences. The thesis intends to explore the characteristics that have a relevant impact on online presence, the level of adoption of social media usage and certain features on websites. As a result, by pointing out the characteristics of museums that are decisive for their online behavior, this research will contribute to the literature of museums, innovation and ICT usage in the museum world. Moreover, especially the comparison of countries gives interesting insights. Firstly, to enable museum managements to learn from other countries, secondly, to encourage policy makers to look at new and additional ways for cultural policies and thirdly, for researchers to follow up and explain these differences in greater depth.

1.2 STRUCTURE

This thesis consists of several parts. The main topics are museums, innovation, new technologies and the interface between them. Following the Introduction the next chapter provides a review of relevant literature and associated studies. It furnishes a theoretical base upon which to work, explains and supports the main arguments of this thesis and stresses the relevance of the study.

Chapter 3, Methodology, discusses previous empirical research, the research method and gives reasons for its selection. Moreover, based on Chapter 2, the main research question

is presented once more. This is followed by an explanation of the method, its approach, the data collection and finally by the presentation of the expectations of this study.

Furthermore, the previous chapters lead to the outcomes and in-depth analyses of the research. Descriptive data and statistical data analyses are used to find an answer to the research question and to test four hypotheses, supported with the help of tables, graphs and charts. Chapter 5, Conclusion, firstly, discusses the limitations and problems of the research and secondly, reviews the main arguments and summarizes the results. The research question is answered and the relationship between the theoretical starting points and the outcomes of the analyses are interpreted. Finally, these sections are followed by suggestions for further research.

2 LITERATURE REVIEW

2.1 MUSEUM

2.1.1 The Role of Museums

Museums have several objectives, functions, and outputs and their characteristics, missions and responsibilities have changed substantially over time (Weil, 1997). Their role has evolved from a leading, independent and superior institution, which guides the general public, to one that is determined by and adapted to the interest of the public. During the last century, museums lost their authority over their decision-making autonomy and had to increasingly adjust their services to the needs of their visitors (Weil, 1997). For a long time, this transformation has been a focus of interest and still is a topic of considerable attention in the cultural sector (Anderson, 2012). Especially the last three decades were characterized by the establishment of various specialized types of museums, which are pursuing different tasks and purposes for their customers (Weil, 1997). Although the more traditional models still exist, there is a whole range of types coming up with new subjects and functions, focusing on entertainment, experience, innovation and attractions, that have been transformed into "Temples of delight" (Economist, 2013; Newhouse, 1998). And as Newhouse discusses in her book "Towards a new Museum" (1998), *"...Not only are there more museums than ever before but also more functions for them to accommodate, more range in the kind of art they contain and more rationales to their design*" (Newhouse, 1998, p.8-9). These developments are the subject of the book by Gail Anderson, "Reinventing the Museum" (Anderson, 2012), in which he summarizes eight crucial points regarding these new roles, responsibilities and tasks:

1. Global interconnection, which asks for a more open, future-oriented and inspired museum thinking.
2. Contributions to the communications, communities and social structures of cities and regions.
3. Serious engagement of the public to ensure long-term financial sustainability.
4. Social responsibilities, representation of diverse people and communities.
5. Meaningful presentation and interpretation of the collection.
6. Offering a whole experience that does not end after the visit, but can be continued online and off-site.
7. Sophisticated, passionate and responsible leadership.

8. A mission, vision and values, which are public-oriented and are focused on innovation, openness and risk-taking (Anderson, 2012, p.8-9).

This shift in responsibilities and practices has several reasons, which are caused by extrinsic and intrinsic influences that have to be recognized and balanced by the management of museums – internal resources, capabilities and objectives on the one hand, and developments in the external world on the other (Anderson, 2012). According to Johnson (2003) and Weil (1997) a crucial driver for this development was certainly the museums' financial need and its dependency on governmental or public funding (Johnson, 2003; Weil, 1997). Next to their social aims, museums were thus obliged to deal with commercial and financial objectives (Camarero & Garrido, 2012). In particular, since the beginning of the twenty-first century they are confronted with ever-changing challenges to their external environment. The Internet, technological innovations, limited natural resources, the economic situation and the increasing connection around the globe require managements to rethink and adapt their strategies (Anderson, 2012).

One crucial aspect of this advanced role is the focus on attracting, reaching and engaging new or existing visitors by offering online services outside the actual museum visit. And this modern field of activities is the central topic of this thesis.

2.1.2 A Definition

Influences and changes of priorities, such as higher visitor-orientation, dependency upon donations, competition from various institutions as well as traditional tasks, make it difficult to clearly define a museum and its main functions. The International Council of Museums (ICOM), founded in 1946, is updating its definition based on the developments and transformations. The current definition from 2007 reads as follows:

"*A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment"* (ICOM, 2007).

This definition summarizes the main tasks of a museum, which are to acquire, to conserve, to research, to communicate and to exhibit. All of these should be accomplished in the interest of society, in order to contribute to its development, education and pleasure (ICOM, 2007). The definition provides a useful frame for the description of museums in general and highlights their wide range of duties. However, the various types and specializations of museums, which are mentioned by Newhouse (1998), need to be further

differentiated and explained (Ginsburgh & Mairesse, 1997). Frey and Meier (2006) categorize museums according to important characteristics. This thesis looks first at the classification of museums by their contents and secondly, at the important role of size (Frey & Meier, 2006).

With regard to the first categorization, there are several types that all share the same principal responsibilities (ICOM, 2007), but have various specializations. The European Group on Museums Statistics (EGMUS) has divided all types into three main content types: Art, Archaeology and History Museums; Science, Technology and Ethnology Museums; and Other Museums. Each of these three groupings has further sub-types that are indicated in Table I. Because of its general applicability, clarity and comprehensibility this thesis applies this classification for further research on types of museums. It is based on the UNESCO classification (1968) of museum types (EGMUS, n.d.).

Table I – Classification of Museum Types

Types of Museums – Classification			
Nr	Type	Sub-Type	Definition
1	Art, Archaeology and History Museums	Art Museums	*- display: fine & applied art* *- institutions: museums of sculpture, picture galleries, museums of photography & cinema, museums of architecture, including art exhibition galleries (maintained by libraries & archives centres)* *- (point 2a UNESCO classification)*
		Archaeology and History Museums	*- display: historical evolution of a region, country, province (over limited period or centuries)* *- owe all or part of collections to excavations* *- institutions: museums with collections of historical objects / remains, commemorative museums, archives museums, military museums, museums on historical figures, archaeological museums, antiques museums,…* *- (point 2b UNESCO classification)*
2	Science and Technology Museums, Ethnology Museums	Natural History and Natural Science Museums	*- display: subjects relating to disciplines such as biology, geology, botany, zoology, palaeontology & ecology* *- (point 2c UNESCO classification)*
		Science and Technology Museums	*- display: focus on one / several exact sciences / technologies* *- planetaria & science centres* *- (point 2d UNESCO classification)*

		Ethnography and Anthropology Museums	*- display: materials on culture, social structure, beliefs, customs, traditional arts,…* *- (point 2e UNESCO classification)*
3	Other Museums	Specialized Museums	*- display: all aspects of a single theme / subject not covered in previous categories & focus on research* *- (point 2f UNESCO classification)*
		Regional Museums	*- display: a region constituting a historical & cultural entity & sometimes an ethnic, economic or social entity* *- (point 2g UNESCO classification)*
		General Museums	*- display: mixed collections & not identifiable by predominant field* *- (point 2h UNESCO classification)*
		Other Museums	*-display: not entering into any of above categories* *- (point 2i UNESCO classification)*

Note: Adapted from *A Guide to Museum Statistics in Europe*, European Group on Museum Statistics [EGMUS], n.d., p.141-142.

The categorization highlights the differences and diverse emphases of museums and illustrates the difficulty of combining them all in one definition. The listing of certain types of museums in this research will be discussed in more detail in Chapter 3.4.

A second categorization method is provided by size, which is another characteristic of interest and independent variable of the research. As Frey and Meier (2006) state, there is a wide variety of museums ranging from very small, with only a few visitors per day that are focused on local or regional scope and not necessarily professionally run, to middle-sized organizations and museums relying on huge numbers of visitors every day that are organized like major organizations. These are called “superstar museums”, such as the Louvre in Paris or the British Museum in London (Frey, 1998; Frey & Meier, 2006; Johnson, 2003). The size, which is defined in this thesis as the number of visitors, clearly influences not only the internal organization of the museum itself, but also its external appearance and actions (Johnson, 2003).

This variety of characteristics and objectives has a substantial influence on the organization, strategies and management. Furthermore, growing importance to society not only as educational bodies, but also leisure facilities and their economic impact has brought museums into the center of economic attention.

2.1.3 Economics of Museums

Because of their variety of functions, museums can be called multiple output firms (Johnson & Thomas, 1998). Due to their offer of mixed, particularly ancillary services, Johnson and Thomas (1998) stress the view of museums as "*productive units*" (p.75). They generate outputs in various fields and these products are dependent upon the objectives, expectations and financial possibilities of the individual institution. Economic theories give a reasonable understanding and a broad picture of museums and their function as output-oriented businesses. They face competition in terms of their financial standing, their visitor numbers, not only within the museum sector, but also in relation to similar leisure activities. This requires management to be aware of changes, to implement innovations and to keep up-to-date with trends and tastes (Johnson & Thomas, 1998).

To be able to explain the behavior of these multiple output institutions, their supply- and demand-side have to be analyzed. The supply-side of museums, thus the cost structure and function, is special and differs from that of other industries (Jackson, 1988). First, museums face high fixed and set-up costs, for instance, buildings, staff, technical facilities or insurance. Once the fixed and set-up costs are paid, customer costs are virtually zero for standard museums, which means that museums deal with low variable costs per visitor. Second, high opportunity costs, for example, the possibility of using the building for other purposes or the costs of keeping a part of the collection in the storage, in combination with the related conservation costs, also serve to define the supply-side (Frey & Meier, 2006). Finally, contrary to many cultural industries that are confronted with the cost disease, namely, rising wages but no increase of productivity, Frey and Meier (2006) mention several possibilities for growing productivity in the museum world, for which particularly new technologies can play a decisive role (Frey & Meier, 2006). With respect to these characteristics, economies of scale dominate the cost structure of the museum market in general. Jackson (1988) found out that small and medium sized museums benefit from economies of scale, whereas museums with more than 100,000 visitors per year face diseconomies of scale. The cost function established by Jackson (1988) is determined by various factors besides attendance, for instance, prices of human capital, conservation and preservation, education, variety of exhibitions, or engagement of visitors. One crucial result of his cost analysis is the importance of membership activities for museums. These measures can actually reduce labor costs by encouraging voluntary work and lower the cost of capital by gaining donations (Jackson, 1988).

The demand-side of museums can be divided into private and social demand. In general, the highest percentage of people visits museums during their leisure time. The demand function is determined by multiple factors, however, three of these are of special interest (Frey & Meier, 2006). Firstly, museum visitors are said to be relatively price inelastic with regard to admission fees (Luksetich & Partridge, 1997). Secondly, the opportunity costs of time are in general positively linked to visitor income, but must be analyzed separately. As tourists are specially planning their visits to a museum or a site, their opportunity costs of time are not as high as those for locals, who would lose a certain amount of income when going to a museum. Thirdly, similar leisure activities, for example, concerts, theatre, cinema, and their prices can influence the demand of visitors. Moreover, lower costs of competitive museums or high travel costs also have an impact (Frey & Meier, 2006).

Understanding private demand is crucial for the strategy of museums as it allows the management to better understand the needs of its visitors. Special services like restaurants, shops, websites as well as an interesting marketing campaign are becoming more important, have an impact on the number of visitors and need to be carefully considered.

According to Frey and Meier (2006), social demand is characterized mainly by two effects, on the one hand, spill-over effects for the contribution to the market through tourism, job generation and a positive influence on a city's hospitality and reputation. On the other hand, they produce value, which is not quantifiable, cannot be easily captured in actual figures and comprises option value, existence value, bequest value, prestige value and education value. All of these values derive from non-monetary and internal sources, for example, the pride of a population to live in a city with a certain museum, an awareness of being able to go to a museum, or an interest in education (Frey & Meier, 2006).

Superstar museums stand out owing to both their demand- and supply-side. They attract vast numbers of people, have an exceptional collection, offer a certain level of commercial services, which is decisive for their income, support the economy of their cities or regions, and frequently have remarkable venues (Frey, 1998). As the costs of developing a website, putting the collection online or producing special online content, see Frey (1998), are independent of museum size, large superstar museums are favored by the general cost structure and benefit from economies of scale. Moreover, some of these museums, in Britain for example, have also realized the potential of creating new venues or of networking and sharing parts of their business with other museums (Frey, 1998; Frey & Meier, 2006).

Next to the influences of the factors mentioned above, the behavior and performance of museums is also highly dependent on their institutional setting, of which an important factor

is financial structure, more precisely financial dependency. Museums can be either public, private or dependent on donations and the constraints, possibilities and guidelines connected to these settings have considerable impact on their actions (Frey & Meier, 2006).

Public museums are funded by government and are less dependent upon generating income as all expenditures are covered by public grants. This security can result in lower efficiency and less visitor orientation. Private museums rely on their own income and are therefore dependent upon the market and its revenues from various sources such as admission fees, ancillary services, or donations. The problem of this structure is that it could result in too much market-orientation and lead to a loss of cultural values. A reliance on donations requires the director to act in the interest of the donors and although this structure results in more effective management and visitor orientation than in public museums, the high dependency on donors can be detrimental and restrictive (Frey & Meier, 2006). However, today it is not so easy to say if a museum is publicly or privately funded. Particularly due to changes in the support by government, museums have been forced to rethink their strategies and often assume a hybrid form of funding (Frey & Meier, 2006; Schuster, 1998).

2.1.4 Trends and Future

Based on these economic analyses, trends can be identified and predictions for the future can be made. Although most European museums are still funded to a high extent by government, many of these institutions try or are forced to reach a certain level of independence (Camarero & Garrido, 2012). This striving for independence implies stronger focus on the demand-side, the visitors and increased competition with other institutions – management is forced to provide experiences that relate to and attract large numbers of people (Johnson & Thomas, 1998).

As stressed by Frey and Meier (2006), particularly the interest for and the importance of superstar museums will further grow, which requires small- and medium-sized museums to keep up and compete with their bigger competitors (Frey & Meier, 2006). Given the cost structure of museums, which certainly favors bigger museums, the smaller ones need to be inventive, open and resourceful by considering innovation and change as crucial driver for success (Camarero & Garrido, 2012). This cannot only be achieved by updating the actual museum visit, for example, by organizing blockbuster exhibitions that are powerful audience attractions (Frey & Meier, 2006), but also by taking into account other ways of attracting, reaching and expanding the customer base. One highly potential and powerful area concerning these goals certainly is ICT, especially the power of the Internet. If adopted and

used properly, ICTs help to innovate the business of reaching customers (Bakhshi & Throsby, 2010). Moreover, the possibilities of Web 2.0 offer a cost-efficient way of communicating with and reaching customers as well as market themselves (Hausmann, 2012; Russo, Watkins, Kelly, & Chan, 2007) and therefore could support small- and medium-sized museums, which often face the burden of high fixed development costs (Frey, 1998).

Being aware of the importance of these factors should encourage museums to rethink and develop successful strategies and to be open for changes. New technical developments, as they can be very helpful in improving the performance of museums, enlarging the experience and attracting and reaching new customers, will further play an essential role in museum management (Camarero & Garrido, 2012; Johnson & Thomas, 1998). It is not easy to make certain predictions, however, the developments of the museum market, the growing influence of digitization and some relevant and more cost-efficient opportunities for small- and medium-sized museums may result in a more equally powerful and distributed museum market – so to say, as claimed by Anderson (2004), an extension of the museum market share to the long tail of these cultural institutions.

2.2 INNOVATION

"*Innovation is the successful exploitation of new ideas*" (Department for Innovation, Universities and Skills [DIUS], 2008, p.13; Department of Trade and Industry [DTI], 2007, p.5) within a firm, a business or an industry and takes place in the private, public or third sector (DIUS, 2008, p.13). In order to stay competitive as well as to successfully run a business, innovative thinking is a crucial tool in the life cycle of a company (Handke, 2010). The growing awareness of innovation, however, makes it more difficult to decide what should be considered as innovation (DTI, 2007). As a result, the term refers to a multitude of concepts, does not have one sharp definition (Handke, 2010) and has various stages and classifications.

Innovation can be divided into product and process innovation, and incremental and radical innovation. Firstly, whereas product innovation results in an alteration of existing products or in a new product that has not been present until its market launch, the latter is an improved and more effective business process that entails cost savings (Handke, 2010). These two types of innovation are dependent on each other, as stressed by Utterback (1990), as a new product usually requires one or more new processes (Utterback, 1990). Secondly, radical innovation refers to a seldom and new case that is mostly independent of existing processes or products. Moreover, its appearance can result in influences on and changes to the environment. Conversely, incremental innovations are changes that happen on a regular basis, which enhance the status quo of products, services or processes, but individually do not have the power to disrupt their environment (Freeman & Perez, 1988). These distinctions are of great relevance as they point out the wide range of innovative actions. Innovation is influenced by supply and demand (DIUS, 2008) and happens due to motives. Radical change is normally the outcome of particular research, while incremental adjustments occur mostly as a result of realizing new ways of running processes more successfully or efficiently (Freeman & Perez, 1988). In particular changes relating to new technologies, which are ever evolving, renewing and interconnected, improve on a constant basis (Utterback, 1990). Therefore, innovation can also stand for an innovative way of adapting existing technologies to a certain business (DIUS, 2008).

The various sources discussed above show the variety of innovation, which, "*…encompasses (a) the process of inventing new products and production processes, (b) the process of innovation in a narrow sense when an invention is introduced to the market, and (c) the diffusion and adaptation of innovation by imitators*" (Handke, 2010, p.203). This

broad definition not only gives an understanding of the wide spectrum, but also stresses the potential power of innovation.

An important subject of discussion in the literature of innovation, which is of importance for this thesis, is the correlation between innovation and firm size. There is an ongoing discussion on the impact of firm size on innovativeness. Authors and scholars have different opinions and results regarding the question as to whether big or small- to medium-sized firms are more innovative (Tether, 1998). On the one side, the Schumpeterian hypothesis claims that due to financial benefits, large and powerful firms are more innovative and markets that are imperfect promote innovative thinking (Schumpeter, 1950, as cited in Acs & Audretsch, 1987a). The other side claims that smaller firms and a competitive market structure push innovation (Acs & Audretsch, 1987a). According to the research of Acs and Audretsch (1987b, 1988), though, these propositions are both not necessarily true, as they found other causes, conditions and environmental influences that have more impact on the innovativeness of firms and that support on the one hand, innovation in small companies and on the other, in large enterprises (Acs & Audretsch, 1987a, 1987b, 1988). These differences of opinions, conclusions and theoretical contradictions can also be replicated in the case of museums, which will be discussed in Chapter 2.3 in more detail.

2.2.1 ICT

New technologies are a decisive innovation driver and further insights into Information and Communication Technologies (ICT) and their wider spread have prepared the ground for innovative adaptations in various sectors (DIUS, 2008). Bekar and Haswell (2013) write that ICTs relate to various techniques of producing, consuming, and distributing information and define them as, "*...the collection of components embodying electronic binary logic ... includes PCs, tablets, phones and other smart devices, and the software running on those devices ... includes the Internet and devices connected to the Internet*" (Bekar & Haswell, 2013, p.10). Particularly the Internet offers many opportunities for innovation in the market structure. Product and process innovations of a radical or incremental nature have altered production, distribution and consumption, and have resulted in cost advantages and higher efficiency (Handke, Stepan, & Towse, 2013).

Within the creative sector, Bekar and Haswell (2013) discuss different levels of influences of new technologies on certain industries. Whereas ICTs greatly affect production, consumption and distribution patterns within commercial creative industries, in traditional creative industries they only influence consumption and distribution, and have little effect

upon production (Bekar & Haswell, 2013). For instance, business in the videogame, music or film industry relies heavily on ICTs. The core product of opera or theatre has not altered. Nevertheless, certain processes have also changed and innovated the nature of these businesses (Bekar & Haswell, 2013). Therefore, without doubt, ICTs and the Internet have brought forth a variety of opportunities for innovation, transformed several established structures, products or processes and will continue to play a decisive role in the creative industries (Bekar & Haswell, 2013; Handke et al., 2013).

However, the actual impacts of ICTs on the market are not yet clear. On the one side, the superstar theory, initially discussed by Rosen (1981) and further supported by various scholars, forecasts a centralized market with only a few market participants, who possess a high market share percentage although there are not necessarily high differences in talent or quality. With the help of ICTs, these few players are able to approach large numbers of people and strengthen their position (Rosen, 1981). This fits in well with the bandwagon theory of Leibenstein (1950), which is about consumers following the tastes of each other (Leibenstein, 1950) and is further pushed by network externalities (Handke et al., 2013). On the other side, the long tail theory states that ICTs support the decentralization of the cultural market and predicts better chances for small and niche products. The spread of new technologies, which results in reduced costs of distribution and more diverse supply and demand possibilities without geographical limits, leads to a more diverse market and a fairer distribution of market share (Anderson, 2004; Brynjolfsson, Hu, & Smith, 2003). As mentioned, both theories have their supporters and it is difficult to make clear predictions as to which one will prevail. The long tail theory, though, implies several questions as to what is to be considered as long tail and that its actual dissemination is still rather limited (Handke et al., 2013).

2.2.2 Innovation in Museums

In the case of museums, innovation can also refer to various segments. Due to the changes in their role and in their business sector, museums have been forced to offer new experiences to their audiences within and beyond their core activities. According to Camarero and Garrido (2012), this involves smaller and incremental changes rather than radical innovations. Moreover, these incremental innovations relate to different fields of the institutions and either concern their main business such as new exhibitions or improvements in the physical experience, or innovation in additional services, for example, online presence or web services (Camarero & Garrido, 2012).

In order to have a coherent picture of innovation in the cultural sector, Bakhshi and Throsby (2010) have developed a framework that classifies innovation in cultural organizations in four areas. Firstly, innovation in audience reach, secondly, innovation in artform development, thirdly, innovation in value creation, and fourthly, innovation in business management and governance (Bakhshi & Throsby, 2010, p.16-20). This framework helps to realize and classify the many possibilities for innovation within museums. And similarly to Camarero and Garrido (2012), it shows that innovative action in this area is mainly about incremental changes and ongoing improvements. Especially with regard to innovation in customer reach, Bakhshi and Throsby (2012) stress the driving force of new digital information and communication technologies, which allow management to employ fresh opportunities for distribution as well as informing and communicating with their audiences. As a result, museums are about to transform traditional processes into innovative ways of running their businesses by using new tools of technology and adapting their online presence to external trends, by developing special apps, online attractions for children and online shops (Bakhshi & Throsby, 2010).

To sum up, Vicente, Camarero and Garrido (2012) define innovation in museums, *"...as a tendency to incorporate new systems, technologies or processes*" (p.652), which stresses that it does not normally relate to radical change, but rather to improvements in certain processes to increase customer reach, create value, develop art forms or enhance management systems. Therefore, point *(c)* of the "definition" of innovation, namely, "…*the diffusion and adaptation of innovation by imitators*" (Handke, 2010, p.203), is of particular interest for museums. Under normal circumstances, they do not create or introduce a new product to the market. For this reason, innovation in museums, which in this thesis is considered as relating specifically to digital technologies, is mostly seen as the application of procedures, which do already exist but have the ability to innovate and enhance their business.

2.3 MUSEUMS AND TECHNOLOGY

As stated in Chapter 2.1, Anderson (2012) identifies eight essential changes in the museum sector, of which two are of exceptional interest for this thesis. First, the increasingly globalized world that asks museums to be more open, innovative and future-oriented. Second, the fact that the museum experience does not begin and end with the actual visit to the museum, but that the public has to be contacted and attracted online before, during and after going to the museum (Anderson, 2012). These market developments and the new role, basic characteristics and objectives of museums represent both motivations and also the outcome of crucial developments in the cultural sector, namely, digitization and technical innovation. Digitization, the Internet and ever progressing and improving digital services require cultural institutions to adapt and make use of innovative technologies (Bakhshi & Throsby, 2010). In general, museums have realized the high potential of the online world and have started to act on a multi-dimensional, virtual and interactive scale. As noted above, the main product of traditional creative industries is not drastically affected by new ICTs, but distribution and consumption patterns are influenced considerably (Bekar & Haswell, 2013).

2.3.1 Development of Technology

Before discussing the main adaptions of innovative technologies in more detail, their development over time has to be reviewed briefly. Around 50 years ago, museums began to realize the potential of technologies, and by the 1990s, a lot of them had introduced new processes within management, such as online collection. Starting in the new millennium, the spread of the Internet and its possibilities for new ways of informing and communicating furnished important catalysts for the management and organization of museums (Navarette, 2013). The focus was on the establishment of an online museum world that is a, "…*digital extension of the museum on the Internet, a museum without walls*" (Schweibenz, 2004, p.1). Furthermore, the last ten years were then characterized by another major Internet development, Web 2.0. Whereas Web 1.0 offers services or websites that primarily inform but do not actively engage consumer (O'Reilly, 2007), Russo et al. (2007) call it *"one-to-many"* communication (p.21), Web 2.0 leads to the participation of consumers. The user is entitled and empowered to choose, comment and create (O'Reilly, 2007; Russo et al., 2007). Because of the power it gives to the public, this innovative method of communication has become extremely important during recent years and has assumed an important role of the online strategy of museums (Simon, 2007).

Without doubt, the museum sector started to adapt to technological change relatively early (Arora & Vermeylen, 2013) and over time, various innovative practices, processes and services were implemented and further enhanced.

2.3.2 Customer Reach

Chapter 2.2.2 discusses the innovation framework of Bakhshi and Throsby (2010), which highlights the crucial role of new technologies especially with regard to innovation in reaching new audiences, which is one of their four aspects. That is why the thesis places a focus on the innovation in customer reach aspect of the framework. Reaching audiences means that either museums try to attract new and more visitors, or deepen the relationship with existing customers. The main innovative potential of innovation in this aspect is the adaption of new technologies (Bakhshi & Throsby, 2010). Museums can implement communication technologies in many sectors such as business processes, research, information management, communications, and evaluation (Institute of Museums and Library Services, 2009). By putting parts or even whole collections online, providing virtual and offering special online services or features, customers are able to become involved, explore and learn something without being physically present (Arora & Vermeylen, 2013). All these methods of informing and communicating enable museums to enlarge their field of services and reach audiences, create wider networks and build a closer relationship with the public (Gladysheva, Verboom & Arora, 2014).

Bakhshi and Throsby (2010) divide innovative ICT usage for cultural organizations into two categories. Firstly, the more regular application of the Internet in terms of websites that provide information, offer online services and function as marketing platforms. Examples of the advantages of distributing and informing online include selling tickets or items via online shops (Anderson, 1999), the possibility to browse through the online collection or to make a tour through the virtual museum (Bakhshi & Throsby, 2010). Secondly, ever-evolving and -improving communication technologies provide increasingly promising opportunities for innovation, which the authors classify in three levels of audience reach: (1) Interactivity, (2) Connectivity, and (3) Convergence (Bakhshi & Throsby, 2010, p.17). Interactivity deals with services that enable visitors to actively take part in creative online services such as online learning resources, games, or competitions (Bakhshi & Throsby, 2010). Kelly and Russo (2008) indicate that sophisticated online learning resources and engagement have the power to appeal to younger audiences and to arouse interest in the physical museum (Kelly & Russo, 2008). In this regard, Loran (2005) discusses one

important trend comprised by learning resources and possibilities that take place completely online, such as games, audio files, or even whole platforms for e-learning, as offered, for example, by the Tate Gallery (Loran, 2005). Second, connectivity is about technologies that allow the audience to connect and communicate with the museum and each other, for example, social media platforms or blogs. And lastly, convergence is an extension to the accessing of information from various devices or specially developed services for the mobile phone, including museum apps (Bakhshi & Throsby, 2010). Mobile technology in general is a promising tool for museums, as the American Alliance of Museums (AAM) stated in 2012. This study points out that in particular, apps for smartphones are essential new features for their online strategies and need to receive more attention in the future (AAM, 2012).

Information and communication technologies provide essential tools for highly promising, innovative online services to reach audiences beyond the physical venue (Bakhshi & Throsby, 2010). Museums apply these mainly in two ways, namely, websites and social media portals. Both are included in the research for this thesis.

2.3.2.1 Websites and Social Media Portals

Websites are essential for visitors not only because they are useful providers of information, but also because of their offer of special services. Educational content, online collections as well as other entertaining and innovative features have the potential to extend, contribute to, or even substitute the actual museum visit to a certain extent (Kotler, 2001). In general, though, in an exploratory study of museum websites and their usage, Marty (2007) detects the existence of a clear relationship between the online and offline museum, and visitors that mostly use websites as a complementary service to the physical visit. The online appearance of a museum has a substantial influence on the whole museum experience. This is why museum management has to be aware of the diversity of online possibilities. The wide range of services attracts various visitors and responds to different needs. Therefore, Marty's research emphasizes the influence of a thought-through online strategy and a sophisticated website on the general performance of a museum (Marty, 2007). Pallud and Straub (2014) also discuss this interdependence of the virtual and physical museum. Similarly, they support the idea that appealing websites increase the likelihood of visits to the actual museum and point to the potential of websites for reaching and attracting customers online and offline (Pallud & Straub, 2014). By conducting research on the online strategies of museum management in Great Britain, Loran (2005) also highlights that websites are an essential tool for different levels of customer reach in line with the Bakhshi and Throsby (2010)

classification. The relationship with regular visitors is deepened and new visitors are attracted and invovled (Loran, 2005). The worldwide investigation of the most visited museums and their use of websites and social media by Padilla-Meléndez and Águila-Obra (2013) shows that museums are able to create online value with their appearance on the web. However, a proper online strategy is essential (Padilla-Meléndez & Águila-Obra, 2013), as already suggested by Marty (2007).

Cunliffe, Kritou and Tudhope (2001) support these arguments by advising museums of all sizes to offer well-developed websites and an ongoing evaluation process to be up-to-date with their visitors' preferences. Differences in the scope and quality of websites and services can be traced back to and explained by the general characteristics of museums, for example, size, type, country, or setting of an institution (Cunliffe et al., 2001). Although Vicente et al. (2012) focus mostly on the impact of funding on innovation and consider various stages and types of innovation in museums, they also look at the influence of size and country. The findings of their research prove that innovation in European museums, particularly of technological nature, depends on their general characteristics (Vicente et al., 2012).

As stressed by Padilla-Meléndez and Águila-Obra (2013), the online presence has the potential to create value. This is achieved not only by the website, but also by the social media presence of museums. Arends, Goldfarb, Merkl, and Weingartner (2009) divide this variety and intensity of innovative web services into three categories, namely, "*explore*", "*educate*" and "*announce and discuss*" (p.1). The category "explore" includes information about the physical museum in general, its exhibitions, and venue. Moreover, this also incorporates the parts of a website that allow the visitor to experience parts of the physical museum online, for instance, online collections or virtual tours. "Educate" is about a museum website's online educational offer with the main goal of providing online services that motivate visitors from different age groups to participate and engage in art. The third category is "announce and discuss" and looks at Web 2.0 and its adoption of certain social media portals. Visitors are encouraged to actively take part, discuss and give feedback (Arends et al., 2009) and these various interactions result in two-way communication (Anderson, 2012).

In 1998, Trant already emphasized the necessity for museums to take action online in order to compete with other cultural informants and to maintain and expand their audiences. Their main challenge, according to the author, is to provide exciting and interesting services and tools that allow their visitors to actively participate. More precisely, he speaks of an, "*…interconnected (hyper) information space, constructed by and for the visitor*" (Trant,

1998, p.125). The influence of two-way communication and participation of museum visitors is examined by various authors and Simon (2007) investigates different approaches in this connection. Museum blogs, video channels, or social media platforms are the tools that create a base for the active participation and interconnection of museums with visitors, or visitors with visitors. Web 2.0 has the ability to address, engage with and connect visitors and all of these achievements, to quote Russo et al. (2007), add value to online communication strategies and furthermore, can be executed in a cost-efficient manner (Russo et al., 2007). Hausmann (2012) investigates the usefulness of social media of museums as an instrument for marketing and shows that, because of their openness and high accessibility, these portals are affordable, extremely useful and support the positive effects of word of mouth. To reach the largest number of customers and to generate as much awareness as possible, the author advises to have an account on the mostly-used social networks. Facebook, Youtube, and Twitter portals approach a huge amount of people and have the power to generate a high density of communication (Hausmann, 2012). Social media application can be much more than an effective means of marketing, though. Kidd (2011) established a three-stage framework of social media usage in museums, which discusses, next to the positive marketing effect, the "Inclusivity Frame" and "Collaborative Frame". The former is about the importance for museums to engage their audiences and to encourage these to participate, mostly via social media portals or blogs, the latter is a perfect form of social media adoption, which asks visitors to actively generate content, for instance, to make and record audio, video or digital stories (Kidd, 2011).

The online presence of museums can take on various forms and results in different outcomes and achievements. If properly executed, the management has the chance to reach new visitors, attract a wider audience and deepen the relationship with existing patrons. To develop an outstanding online presence, the museum management needs to have a clear strategy and this depends greatly on the general characteristics of the respective museum (Cunliffe et al., 2001; Vicente et al., 2012; Frey & Meier, 2006). The following chapter introduces and discusses the main characteristics of the research in this thesis.

2.3.3 Museum Characteristics

For various reasons, museum characteristics, such as size, type, financial standing or country, influence the behavior and result in different levels of innovative technological adaptions (Cunliffe et al., 2001; Vicente et al., 2012; Frey & Meier, 2006). Based on

literature, theory and their relevancy in conjunction with new technologies, the research focuses on the characteristics Size, Type of Museum, Country as well as Competition.

- **Size**

Size is a major characteristic that influences the behavior and appearance of museums. With regard to the development and maintenance of an extensive online presence, Cunliffe et al. (2001) and Kotler (2001) address the financial disadvantages of small- and medium-sized museums (Cunliffe et al., 2001; Kotler, 2001). Due to their financial capabilities and the industry related cost function, larger museums are more likely to invest in innovative services than smaller museums (Frey & Meier, 2006). The research of Vicente et al. (2012) confirms this statement by showing that large art, history and archaeology museums, in terms of employee numbers, adopt more technological innovations, indeed (Vicente et al., 2012). Based on theory and literature, this thesis expects size to positively influence the innovativeness and by researching on this characteristic, it aims at helping not only small but also big museums to realize this gap, learn from and help each other.

- **Type of Museum**

The list of types of museums in Chapter 2.1.2 already indicates the variety of objectives and intentions of these institutions. They have special priorities, deal with different topics and address certain audiences (Frey & Meier, 2006; Weil, 1997). The research of Rentschler and Geursen (2003) highlights these contrasts and shows that websites depend on the purpose and goals of museums (Rentschler & Geursen, 2003). According to Arora and Vermeylen (2013), "*...art museums have made extraordinary use of the technological innovations to seek out and engage with existing and new audiences*" (Arora & Vermeylen, 2013, p.3) and the research of Loran (2005) also indicates that art museums have been pioneers with regard to the development of a virtual museum and in the UK, museums have put a great deal in providing their collections online. Other types have also realized the power of these services and have followed the example of their competitors (Loran, 2005). This thesis aims at providing insights on the various types and clarifying their levels of innovativeness. On the one hand, it could be assumed that science and technology museums offer more innovative features (e.g. mobile technology or online education) or have better engagement strategies than "traditional" types, such as archaeology or history museums. On the other hand, art museums might be more advanced in offering their collections online than other types are.

- **Country**

The influence of a country on museum behavior is of equal relevance. One main driver behind the differences is cultural policy, which generally alters between nations and results in diverse circumstances for cultural institutions (Vicente et al., 2012). The study of Vicente et al. (2012) looks at four major European countries, France, Italy, Spain and the UK and shows that the highest innovative adaption of technology can be found in Great Britain (Vicente et al., 2012). This conclusion corresponds with Loran (2005), who reports that particularly because of supportive governmental structures, museum websites in the UK are, "*exemplary cases from which to learn good practices*" (p.27-28). Therefore, it has to be underlined that in general, differences exist and Great Britain is the leader in the innovative use of ICT in museums. By researching on the influence of country, the main objective is to highlight the higher level of innovativeness in Great Britain, which should be applied as best practice for the museums of the Alpine nations.

- **Competition**

The literature review clearly highlights the increasingly competitive situation of museums, which requires the management to stand out from the crowd and to be innovative (Anderson, 2012). Therefore, it could be expected that this external influence impacts the innovativeness of museums – higher competition might be one reason for and result in a higher level of innovation. This insight could then be an indication to help museums that are facing less competition to also realize the benefits of new technologies.

Chapter 2.3 stresses the relevance of new technologies and innovation for museums. With reference to the definition of innovation in this thesis it is achieved through websites with regular as well as special innovative features and/or through the help of social media networks. These innovative applications can be utilized to simply inform, market, educate, encourage and engage. The review highlights that the online presence between these cultural institutions differs and there are various levels of ICT employment that are dependent upon certain characteristics. Four decisive characteristics will be the central points of investigation in this thesis. The size, the type, the location of museums as well as their competitive situations. Further insights on the variables and more detailed expectations on the role of these characteristics will be discussed in Chapter 3.5 and 3.6.

3 METHODOLOGY

This chapter discusses the research method of the thesis, website content analysis, and gives deeper insights into the structure, the organization and the implementation of the study. First of all, the empirical literature is reviewed, followed by the research question. The next chapters present the chosen method, the research sample and the data collection process of the research. Finally, Chapter 3.6 discusses the expectations - four hypotheses – of the thesis and Chapter 3.7 gives an overview of the statistical execution.

3.1 REVIEW OF THE EMPIRICAL LITERATURE

A considerable amount of research has already been completed on museums with regard to their innovativeness, their online presence (websites and social media) and the advantages of ICTs. Important results are discussed in Chapter 2, however, in order to stress the relevance of the approach of this research, similarities, variations and gaps of their methods need to be assessed.

On the one hand, several papers involve research on museums and their online presence from the visitor's point of view. Their main aim is to detect the importance, usability and functionality of websites and based on their results, museums are advised how to work on their online strategy. Cunliffe et al. (2001), for instance, conduct a mix of research - interviews, a case study and online questionnaires. They focus on researching the opinion of the audience in order to gain insights into the importance of well-developed websites and their usability for visitors (Cunliffe et al, 2001). Marty (2007) aims to detect why customers visit and revisit websites by doing online surveys. Moreover, in relation to these objectives, Pallud and Straub (2014) conduct an experiment on the influence of features of museum websites on the demand-side (Pallud & Straub, 2014). As mentioned earlier, all three papers have similar outcomes and connect to each other. Their results are mostly based on opinions and answers on the customer side.

Hausmann (2012) on the other hand, looks at the supply-side and carries out a case study on social media usage as a marketing tool. By analyzing the Facebook portal of one museum regarding certain criteria, her research heads in the direction of website analysis. Nevertheless, as it only investigates a single museum, the focus is on a more detailed but less generalizable result. Moreover, Loran (2005) concentrates her research on museums and their online strategy in Great Britain by interviewing museum managers and directors. The author also stresses factors that are important for reaching visitors but does not primarily intend to explain the characteristics that are decisive for the online presence of these institutions.

Nonetheless, her study highlights the general higher innovativeness of the UK compared to other countries (Loran, 2005). Besides conducting an interview and analyzing data that was publicly available, Padilla-Meléndez and Águila-Obra (2013) carry out a website content analysis to stress the importance of good online strategies for value creation. Similar to this thesis, their study looks at features with regard to their functionality, not their design (Padilla-Meléndez & Águila-Obra, 2013). Although it pursues three different research approaches, with only 40 museums their sample is rather small for a quantitative approach. Two other papers that conduct website content analysis report the same size of research sample. Rentschler and Geursen (2003) look at 40 museum websites in Australia in order to test a specific tool that examines the marketing power of websites, while Johnson and Carneiro (2014) investigate 43 ethnic museums in America, their online appearance and the results that are achieved through the use of digital technologies. Both pursue quantitative and qualitative analyses of these websites and besides checking for content that is counted and defined in the coding manual, the researchers completed an initial qualitative assessment of the sites, which is included in their results (Johnson & Carneiro, 2014; Rentschler & Geursen, 2003). The interesting results of Vicente et al. (2012) were already pointed out earlier. Comparable to the research in this study, the authors wanted to find out which characteristics influence innovation in museums. They did so by classifying innovation in four sectors, defining certain characteristics for innovativeness in an index and on this basis, conducting questionnaires with 408 museum curators. In addition, the research focuses only on art and history museums and defines museum size through the number of employees (Vicente et al., 2012).

A couple of papers conduct research on the demand- as well as supply-side and pursue a qualitative or quantitative approach that relies mainly on personal replies. As website content analysis objectively evaluates websites with regard to certain fixed criteria, it represents a reasonable approach in combination with other methods. Moreover, although the paper by Loran (2005) supports the argument that some countries are more innovative than others, it is important to stress that virtually none of these papers researches or tries to explain the influence of museum characteristics on innovation in museums. One that does this (Vicente et al., 2012) adopts a broader perspective on innovation, includes only one type of museum and has a different definition of size. In addition, so far website content analysis has not been a common technique in the museums sector and the above reviewed approaches have differing focuses and a rather small research sample for a quantitative method.

This research summary justifies and supports the choice of conducting a content analysis of websites and social media portals in order to investigate innovative ICT usage by museums. The combination of the interesting method, the focus on both websites and social media portals, the objective of understanding the correlation between characteristics and their online innovativeness as well as the extensive research sample of 171 museums make this research essential and important.

3.2 RESEARCH QUESTION

This research aims at detecting which characteristics have the greatest influence on innovative ICT usage by museums. By comparing their online presence, or more precisely, by looking at their websites and social media portals, this study intends to find an answer to the following research question:

Which characteristics impact the online presence of museums in terms of innovative ICT usage? An investigation of Austrian, Swiss and British museum websites and social media portals.

Given the research question and the main subjects of interest of the study, website content analysis is the most appropriate method for answering the underlying question.

3.3 WEBSITE CONTENT ANALYSIS

The traditional concept of content analysis is mostly used in the communications and media sector and analyzes newspapers, documents as well as texts and, "*...seeks to quantify content in terms of predetermined categories and in a systematic and replicable manner*" (Bryman, 2012, p. 290). This definition already reveals the main objective of investigating content of a certain medium. As it is a quantitative approach, data collection is conducted with the help of classifications that are established before starting the research. This enables the researcher to adhere to rules and remain unbiased, thus guaranteeing an objective and systematic analysis, which, according to Holsti, are two prerequisites of this methodology (Bryman, 2012; Holsti, 1969, as cited in Bryman, 2012).

In particular, the spread of digital documents and contents, such as online journals, newspapers, or protocols as well as the wealth of opportunities provided by the Internet, has put the spotlight on (computational) content analysis. Nowadays, within the social science it is a crucial research method (Krippendorff, 2013). It is to note that content analysis is not

necessarily only linked to mass media but can also be employed for various scenarios. The procedure of establishing categories, combining them in a coding manual and collecting data under their rules can be used for a broad range of areas and applied in many disciplines (Bryman, 2012; Krippendorff, 2013).

The concept of content analysis has the aim of, *"...making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use*" (Krippendorff, 2013, p.24), which stresses the possibility for easy website replication. As stated by Bryman (2012), the process of (website) content analysis requires the determination of a topic of interest and the setting of a precise and fitting research question. This is followed by the choice of a representative research sample and date relating to what or who will be investigated, at which time and in which time frame. Most importantly, the next decision has to be made regarding the countable content. Regularly used contents of this research are, for instance, words, certain subjects, or actors. In the case of this thesis, however, certain predetermined features on websites and social media portals are looked for. Furthermore, the counted content has to be coded. The coding manual includes all relevant information on what needs to be counted and guides the researcher through the process of (website) content analysis (Bryman, 2012). The following sections provide further information on all relevant stages of the study.

3.4 RESEARCH SAMPLE

The research in this thesis focuses on museums in Austria, Switzerland and the United Kingdom and therefore compares rather traditional Alpine nations and the more open British nation. As the main characteristic is the size of museums, which in this context is defined as number of visitors per year, it was necessary to obtain the relevant information. Because of the limited time frame of a master thesis, it was not possible to take into account every single museum in these three countries or to receive visitor numbers for all of them. Therefore, some decisions and restrictions regarding the sample had to be made, even though these might result in some limitations concerning the results.

The samples and visitor numbers for each country are based on three individually generated lists, published by three different national platforms/research institutes[1]. These lists provide information on the names of museums and their visitor numbers. All of the samples

[1] The lists for Austria and the UK were retrieved from official websites: Austria - www.statistik.at, United Kingdom – www.alva.org.uk, whereas the list for Swiss museums was provided directly by the research department of the Swiss Museums Association www.museums.ch.

include various types of museums, which are arranged with regard to the EGMUS classification of museums (Table I) discussed in Chapter 2.1.2. This means, institutions that are frequently added to those list, but do not fit into this framework, such as zoos, are excluded from the sample. As these sources start their listings from different visitor numbers, the researcher decided to include all museums counting 20,000 or more visitors. This decision is also in line with their general online activity, as institutions with fewer than 20,000 visitors per year would not contribute much data to the research. Moreover, for language reasons, the researcher speaks only German and English fluently, German- or English-speaking nations were selected and this is why the websites of the museums in the French- and Italian-speaking regions of Switzerland were excluded from the research. Table II gives an overview of the location, the number of museums and the different types that are contained in the country-related samples.

Table II – Research Sample Overview

Research Sample		Type of Museum			Total
		AAH Museum*	STE Museum**	OT Museum***	
Country	Austria	16	7	22	45
	Switzerland	36	11	12	59
	United Kingdom	31	6	30	67
Total		83	24	64	171

***Art, Archaeology and History Museum; **Science and Technology Museum, Ethnology Museum; ***Other Type Museum**

There are no firm guidelines as to sample size. It is well known that the more extensive a sample is, the more reliable and justifiable the results are (Field, 2009). Regarding the rules of Green (1991), a minimum sample size has to have either "*50 + 8k"* (to explain the general model) or "*104 + k"* (to make a more precise analysis of predictors) (Green, 1991, as cited in Field, 2009, p. 222). In total, the research sample lists 171 museums and four prediction variables, which adds up to 50 + 32 = 82 and 104 + 4 = 108.

It has to be kept in mind that these samples refer to data collection procedures of various institutes. Consequently, this can result in differences in the calculated numbers of visitors. Moreover, these lists are based on the choice of museums of the institutes, which do not include every museum. However, as already noted, given the scope of this thesis and the limited time period of the research, these lists are the best, most reliable and helpful sources for a large number of museums and their visitor figures in Austria, Switzerland and the UK.

3.5 DATA COLLECTION

The data of the research includes various online features on museums websites and social media portals that are used to reach or attract customers. The initial step is the determination of the independent and dependent variables.

3.5.1 Independent Variables

The innovativeness of museums is influenced by certain factors, such as size, type and country. Moreover, as these institutions are now facing stiffer competition than in the past, this is also a crucial characteristic of the museum world. For this reason, these four factors constitute the independent variables of the research. First of all, **Size** within the context of this study is defined as the number of visitors to a museum per year and is adopted on a continuous scale. **Type of Museum**, classified in the three categories according to the EGMUS framework, namely, (1) Art, Archaeology and History Museum, (2) Science, Technology and Ethnology Museum, and (3) Other Type Museum, is the second independent variable. The location, **Country,** of the museums is the third independent variable and has three categories, namely, Austria, Switzerland, and the UK. Fourthly, the research looks at museum **Competition**. In this thesis, the researcher defines competition as the number of competitors that a museum has within one "market", which is seen as consisting of all the museums within cities located within a radius of 20 km. To analyze the competition of a museum in London, for example, the researcher looks at the number of institutions in this market and this number, minus 1 for the venue itself, results in the density and is thus determined as the competitive number. Finally, the outcomes of the investigation provide an answer as to if and which of these independent characteristics affect the online presence of the institutions.

Shared Website is a further independent variable of the research. To be counted as such, two or more museums need to have the same website domain. A museum is able to have its own section, however, it shares the initial page and in most of the cases some features as well. This variable is not included as independent variable in the multiple regressions, as with regard to the Research Sample it is only present in the British museum world and therefore has no significant effect due to the existence of the Country variable.

3.5.2 Dependent Variables

Having established the independent variables, the variables of a dependent nature need to be characterized. The **Innovation Index** is the main dependent variable and was developed for the study. Within the context of this thesis, the Innovation Index score is considered as

representing innovative ICT usage of museums. As concluded in the earlier chapter, this thesis regards innovative ICT usage by museums as the usage *"...of procedures, especially digital technologies, which do already exist, but have the ability to innovate and enhance their business*". Therefore, the total Innovation Index score of every individual museum is taken as the innovativeness of their online presence on the web. This number then allows a comparison between all the museums that takes into account their size, type, location and competition. The researcher is well aware of the limitations of this index. It is limited to her choice, which does not include every possible feature or provide a full picture of innovative ICT usage. Moreover, the decision to weight all features equally in order to avoid bias is also a drawback of the index, as not every feature might have the same level of innovativeness. But given the limited time and scale of this master thesis project, it provides a comprehensive and manageable framework to work with.

Table III – Innovation Index Calculation

INNOVATION INDEX	
Features	Points
1. Facebook	[0] No, [1] Yes
2. Twitter	[0] No, [1] Yes
3. Instagram	[0] No, [1] Yes
4. Youtube	[0] No, [1] Yes
5. Virtual Collection	[0] No, [1] Yes
6. Online Shop	[0] No, [1] Yes
7. Museum App	[0] No, [1] Yes
8. Movable Images	[0] No, [1] Yes
9. Blog	[0] No, [1] Yes
10. Online Art Education	[0] No, [1] Yes
Total Sum Innovation Index	**0 - 10 Points**

The Innovation Index consists of various website features, which were counted during the data collection for the website content analysis (see Chapter 3.5.3). After the counting of the defined content on the websites and social media portals is completed, all these features are added up in the Index (Table III). A museum can reach 0-10 points in total. The features are treated as binary or dummy variables, if a website has a certain tool it counts as 1 and if it does not it counts as 0. And this number then allows an objective comparison of innovativeness, based on the defined criteria of this research.

Moreover, further analysis deals with social media adoption by museums and includes dependent variables of a continuous nature. One of these is social media **Start Time**. This is applied by using the quarterly date of accession, for instance, in 2009 a museum could have

set up an account either on 01/01, 01/04, 01/07 or 01/10. It is then possible to detect if there is a relationship between the independent variables and an innovative early adoption of social media. Importantly, due to the general rate of adoption of the investigated social media portals, the statistical analysis only focuses on one social media network starting date, namely, **Facebook Start Time**. In all three countries, museums use this at an average rate of 92%, which means 158 out of 171 museums have a Facebook page. The reason for this choice is visualized and further supported in the descriptive part of the results, which also discusses the adoption of Instagram, Twitter and Youtube. The variable **Facebook Likes** is also considered in the analysis. In this research Facebook Likes represent the online market as opposed to the offline market, which is defined by visitor numbers. This definition enables the researcher to compare the shares of the online and offline market.

3.5.3 Coding Manual

In order to make the process of data collection for the innovation index and further continuous variables as transparent and comprehensible as possible, a coding manual has to be established. This means that certain "countable" criteria or definitions for every feature are determined in advance and provide guidelines for information gathering (Bryman, 2012). However, prior to discussing these features, an initial requirement of this research, museum websites, has to be dealt with. Whereas a regular museum website is no longer a real indicator for innovativeness, it is still crucial for the analysis. As a result, museums that are represented on other websites, for example on the site of a city or tourism institution, are excluded from the research. However, museums administered by a single umbrella organization, which is often the case in Great Britain, and therefore share the main website or some features with other members of this organization are counted. As can be seen in Table IV, these shared features are counted as extra and examined in the descriptive analysis.

When the prerequisite of this research, namely having a website, is fulfilled, innovative ICT usage has to be defined. In this thesis this means the offer of certain online tools in different website areas and specific quantitative indicators on accounts of the differing social media platforms. Table IV gives further information on the classification and the variables.

Table IV - Coding Manual

Coding Manual			
Concept	Dimension	Variable	Code
Museum Characteristics	Museum Characteristics	Name of Museum	Name of Museum
		Country	[1] Austria [2] Switzerland [3] United Kingdom
		Museum Type	[1] AAH Museum [2] STE Museum [3] OT Museum
		Size	Number of Visitors
		Competition	Museum density per Type and Market
		Shared	[0] No Shared Website
			[1] Shared Website
Innovation Index	Social Media Adoption	Facebook Instagram Twitter Youtube	[0] No [1] Yes [2] Shared
	Website Feature Adoption	Virtual Collection Online Shop Museum APP Movable Image Blog Online Education	[0] No [1] Yes [2] Shared
Social Media Characteristics	Facebook Performance	Facebook Likes	Number of Likes
		Facebook Visits	Number of Visits
		Facebook Rating	Scale of Rating
		Facebook Time	Start Date
	Instagram Performance	Instagram Likes	Number of Subscribers (Likes)
		Instagram Posts	Number of Posts
		Intagram Time	Start Date
	Twitter Performance	Twitter Likes	Number of Followers (Likes)
		Twitter Posts	Number of Tweets
		Twitter Time	Start Date
	Youtube Performance	Youtube Likes	Number of Subscribers (Likes)
		Youtube Views	Number of Views
		Youtube Time	Start Date

3.5.3.1 Coding Manual Variables

The selection of online features is based on the theoretical and literature review and represents a diverse choice of features that concern innovative ICT usage and new ways of distributing and consuming the museum experience via the web. It consists of seven main points: (1) Social Media (subdivided into four portals); (2) Virtual Museum / Online Collection; (3) Online Shop; (4) Museum App; (5) Online Education; (6) Blog; (7) Moving Images. These are then all combined in the main dependent variable, the Innovation Index.

With regard to the website features, it is necessary to mention that five out of six focus on the functionality of the online offer, which means that design is not considered. One feature, Moving Images, is a combination of functionality and design. On the one hand, it provides information in the form of a video or divers pictures, while on the other, it can also add to the design of the website.

(1) Social Media

The thesis investigates four social media platforms - Facebook, Twitter, Instagram and Youtube. Clearly, these are not the only possibilities regarding the use of social platforms. However, in the case of this thesis such a choice gives an accurate and broad picture (communication via posts, pictures, videos or a mixed form of posts and pictures) and serves as a solid basis for the analysis of general and innovative social media usage. A primary precondition for deeper research on social media portals was the possession of an account with the certain platform. Therefore, the first part of the social media investigation is based on a dummy variable. Furthermore, as having a portal does not necessarily give information about the real social media activity of a museum, a time period of three months, in which the last post has to be reckoned, is specified, as this ensures that only museums with a certain activity level are included, while still allowing less active social media portals to be counted.

1. Facebook: for more in-depth analyses, continuous data was collected regarding the number of likes, the number of visits and the rating of the FB-page in quarter and year since when this account has been used.
2. Instagram: similarly to the data generation on Facebook, further information was gathered on the number of pictures, number of subscribers (further considered as Likes) and entry dates.
3. Twitter: the number of tweets, number of followers (further considered as Likes), and once again quarter and year of joining are documented.

4. Youtube: the number of video views, subscribers (further considered as Likes), entry year and quarter are noted.

(2) Blog

Like social media portals, blogs enable museums to keep their visitors updated about news or events on their website. To be counted as using a blog, someone first has to be able to find the blog directly linked to the website. This means that the blog has to be found on the website and run under the name of the museum. Secondly, many museums use a WordPress blog, which is also positively counted.

(3) Online Collection / Virtual Museum

To ensure that the online collection of smaller museums is counted, the required minimum amount of online art works or pieces is set at 50 pieces per collection. As the research sample not only includes art museums but also specialized museums with collections that do not all exhibit paintings or pieces, this thesis also counts similar factors in specialized museums such as the number of online books, publications, or artefacts. Furthermore, the sample also contains museums that do not have any items to put online, for example, open air museums. In such cases, the research considers if these institutions offer a virtual tour through the venue. An online collection and a virtual tour through the museums are certainly not the same and there may also be museums that offer both services. Nonetheless, because of the reasons mentioned above, this classification is useful for the inclusion of how various types of museums put important parts of their collection, exhibition or main content online and try to reach and attract audiences.

(4) Online Education

The educational content of museum websites mostly informs visitors about museum tours, workshops, consumer involvement, special games for children or similar offerings for schools, children, families, adults or groups in the physical venue. This thesis explores the innovative use of education by searching for art education that takes place completely online. This includes possibilities for children, schools or adult visitors to engage, prepare or work on something connected to the museum or an exhibition online in advance or after a visit. Within the context of the research, this contains, for example, complete online learning platforms, games, forms to be filled in, audio information, workshops or competitions for children, groups or schools. Moreover, being part of the Google Art Project is positively counted as well, as it gives consumers the chance to not only engage online with and learn

about the art of the museum itself but also allows them to explore the museum in connection with other museums throughout the world. However, as this feature focuses specifically on education that provides customers with possibilities that are completely online, downloadable resources that can be used by teachers to prepare a visit in class do not count as online art education. Neither do other additional downloadable files, games or sheets that furnish information about museums or exhibitions and can be printed for the actual visit.

(5) Museum App

This new form of engaging visitors prior to, after or during their visit is one of the less frequently adopted services of an online strategy of museums. To be counted and included in the coding manual, a museum has to offer at least one app, either for mobile phones, tablets or both, which is published by the museum. This includes apps that provide general information about the museum or that are especially developed for an exhibition. Apps that include information about museums but are launched by other institutions, for instance, by a city or a tourism portal, are rejected and counted as zero.

(6) Online Shops

In order to be counted as an Online Shop, this thesis requires the website to have a listing of items on sale, which can be clicked, ordered and paid online, and which will then be dispatched by the museum. Furthermore, museums that offer the possibility of ordering particular articles (books, catalogues) personally via email, but still send them and arrange delivery are also positively reckoned. The index does not incorporate the service of reserving items that can be collected subsequently from the museum shop.

(7) Moving Images

In this research, moving images are defined either as pictures that are not static or videos on the website (no videos from Youtube or websites with similar services). However, both possibilities are only counted if they are implemented either on the first page or on a page one click further than the main homepage.

Having defined these features, the investigation of websites and social media portals of Austrian, Swiss and British museums started, was executed manually and conducted from February 15th 2015 until March 20th 2015 by the researcher herself. The strict guidelines, the predefined coding manual and fixed features simplified and assured a transparent and comprehensible data collection.

3.6 EXPECTATIONS

The previous chapters already highlight relevant characteristics that shape a museum and expected relationships between those. These insights provide a solid foundation to build on and to formulate four hypotheses. They will help to find an answer to the central research question and to draw conclusions on the most important influences on innovativeness.

Hypothesis 1: Larger museums are more innovative with regard to their ICT usage than smaller museums.

The theoretical and empirical backgrounds already point out the relevance of this statement. In general, the literature on innovation suggests two possible scenarios in connection with the correlation between organizational size and innovation. One side argues that large companies, particularly because of financial advantages, are more innovative than their small competitors, whereas the other side stresses that small firms promote innovation, due to the competitive market structure and the need to survive. These different point of views are replicated in the world of museums and have already been discussed in the literature. The main argument is that especially due to their financial possibilities, larger museums are in favor of technological innovation. This is why, with reference to the literature and studies, this thesis wants to test this argument and the controversy and claims that large museums are more innovative with regard to their ICT usage.

Hypothesis 2: Smaller museums are innovative and active adopters of social media networks.

As mentioned earlier, social media provides a relatively cost-efficient opportunity for museums to take action and to reach audiences on the web. Due to this fact and their financial disadvantages, it may be assumed that smaller museums are more innovative with respect to their social media adoption strategy. Therefore, it can be expected that smaller museums were early adopters of social media.

Hypothesis 3: AAHs (*Art, Archaeology and History Museums) are more innovative than other types (STEs – Science, Technology and Ethnology Museums & OTMs – Other Type Museums) of museum.*

Hypothesis 3 refers to the variety of interests and objectives of different types of museums. Clearly, these differences can also affect the attitude towards an online strategy and innovation in general. The literature and the empirical study of Loran (2005) claim, that

art museums in particular were early users of new technologies, in order to reach visitors and to offer them an online experience. Although Loran (2005) also stresses that other types soon became aware of these new options, based on the literature it can still be argued that art museums have a higher level of innovation than their competitors.

Hypothesis 4: Museums in the UK are more innovative than museums in Austria and Switzerland.

This hypothesis is based on the arguments that British museums are very innovative, were early adopters of innovative technologies and are always improving their online strategy, website and social media presence. With technology-affine and innovative museums, such as the Tate Gallery or the Victoria and Albert Museum, Loran (2005) highlights the UK's leading position in Europe. The study proposes that museums in the UK are more innovative than the institutions in the Alpine nations Austria and Switzerland and should be an example to the museum world, *"...from which to learn good practices*" (Loran, 2005, p.28). As stressed earlier, some museums have started to share parts of their business and build networks (Frey, 1998; Frey & Meier, 2006), which is particularly true in the UK. The researcher considers this factor and claims that having a shared online presence supports innovativeness in the UK.

3.7 STATISTICAL EXECUTION

Before presenting and analysing the results of this research, it is important to discuss the main statistical method used for the investigation of the data. SPSS is the applied software and all relevant variables and inputs are transferred into the program. Initially, the basic processing of data is primarily of a descriptive nature, including Independent T-Tests and One-way ANOVA analyses.

Furthermore, the fact that this thesis considers more than one variable in order to predict innovation already points out the most appropriate solution, which is multiple regression. Like linear regression, which uses a simple equation with one predictor in order to explain a certain outcome, multiple regression has the same intention but with more than one predicting variable (Field, 2009). Size (number of visitors), Type of Museum, Country and Competition are the predicting variables of the model and the results show how relevant the model is in general and which of these variables explains the innovativeness of museums the best. The equation below, retrieved from Field (2009, p.210), demonstrates the composition of the outcome Y:

$$Y_i = (b_0 + b_1X_{i1} + b_2X_{i2} + ... + b_nX_n) + \varepsilon_i$$

As this research seeks to investigate three dependent variables that stand for innovation, the results of this thesis are based on descriptive data, basic statistical tests and three multiple regressions. The Y outcome of the multiple regression is, first **Innovation Index,** second, **Facebook Start Time** and third, **Facebook Likes.** The execution of the regression is carried out in a hierarchical and stepwise manner, the researcher choosing the arrangement of the input of predictor variables and entering them in a blockwise process. Field (2009) suggests a decision on the order of these based on outcomes of previous papers, theoretical predictions and the importance of the variables (Field, 2009).

On the basis of the theoretical chapters of this thesis, the researcher placed **Country** first, **Size** second, **Type** third, and **Competition** fourth. As concerns the multiple regressions with regard to social media, **Size** is the first, **Country** the second, **Type** the third and **Competition** the fourth block. **Shared Website** is a dummy variable that is not included in the regression models but analysed separately in an Independent T-Test.

Competition as well as Size are treated as continuous variables. As the latter has some exceptional and influential outliers, the study takes the logarithm of the variable Size in order to avoid and reduce bias. The variables Country and Type of Museum have three categories. Therefore, it is necessary to create two "*dummy variables, ... which is a way of representing groups of people using only zeros and ones*" (Field, 2009, p.254). Whereas the United Kingdom is the reference category for Country (UK vs. AT, UK vs. CH), Art, Archaeology and History Museum represents the reference for Type of Museum (AAH vs. STE, AAH vs. OT). The dummy variables referring to one independent variable are entered into the same block (Field, 2009).

4 RESULTS

This chapter presents the results of the data analyses and is structured as follows. Firstly, descriptive data of the variables is presented and analyzed. Secondly, on this basis, the study takes a closer look at the role of Types of Museum and Country on the Innovation Index. Thirdly, the impact of Size and additional related influences are examined, followed by a descriptive analysis of social media portals. Finally, the chapter looks at the results of the more in-depth statistical analyses, the multiple regressions.

4.1 DATA ANALYSIS

An initial analysis of the museum data gives some general and interesting insights: Art, Archaeology and History Museum represents the highest share of the research sample (48.5%), followed by Other Type Museum (37.4%) and Science and Technology Museum (14%). The distribution of countries is as follows: the majority of museums in the sample are from the United Kingdom - 67 museums (39.2%), the list of Switzerland consists of 59 (34.5%) and of Austria of 45 museums (26.3%). Additionally, Table V shows that approximately one quarter of all museum websites are shared.

Table V – Frequency Country/Type/Shared

Country	Frequency	Percent	Cumulative Percent
Austria	45	26.3	26.3
Switzerland	59	34.5	60.8
United Kingdom	67	39.2	100.0
Type	Frequency	Percent	Cumulative Percent
Art, Archaeology and History (AAH)	83	48.5	48.5
Science and Technology (ST)	24	14.0	62.6
Other Type (OT)	64	37.4	100.0
Shared	Frequency	Percent	Cumulative Percent
Not Shared	128	74.9	74.9
Shared	43	25.1	100.0

The scores of the Innovation Index (M=5.48, SD=2.66) certainly vary between each other and highlight some important trends (Table VII): 50% of the scores of the total sample are located in the middle range of the Innovation Index (4 to 7 points), whereas the other cases (25.7%, respectively) score either 3 points or below on the lower and 8 points or above on the upper side. The most common Index score is 4 points, reported by 17% of museums. Table VI also shows the Size mean (M=421,682.08) and Competition mean (M=6.62), which both have high variations in their values, indicated by the standard deviation.

Table VI – Descriptives Innovation Index/Size/Competition

	Mean	Median	Std Dev	Variance
Innovation Index	5.48	5.00	2.66	7.09
Size	421682.08	126600.00	953884.12	9.10
Competition	6.62	5.00	6.13	37.54

Table VII – Frequency Innovation Index

Innovation Index	Frequency	Percent	Cumulative Percent
0	2	1.2	1.2
1	9	5.3	6.4
2	11	6.4	12.9
3	22	12.9	25.7
4	29	17.0	42.7
5	17	9.9	52.6
6	17	9.9	62.6
7	20	11.7	74.3
8	12	7.0	81.3
9	19	11.1	92.4
10	13	7.6	100.0

Moreover, the correlations between the independent variables and dependent variable Innovation Index (Table VIII) are already an indication for the importance of Size (Pearson's r=.445) and Country (r=-.203, r=-.474). Competition plays a moderate role as well (r=.301). Both values with regard to Type of Museum display a correlation between the independent and dependent variable. The insignificant Pearson's r value of AAH vs. OT (r=-.021), though, already stresses less power of this variable.

Table VIII – Correlations Innovation Index/Independent Variables

	Size	UK vs. AT	UK vs. CH	AAH vs. STE	AAH vs. OT	Competition
Pearson	.445**	-.203**	-.474**	-.168*	-.021	.301**
p (2-tailed)	.000	.008	.000	.028	.782	.000
N	171	171	171	171	171	171

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.2 DATA COMPARISON

4.2.1 Type of Museum and Country

This section takes a closer look at the influence of the variables Type of Museum and Country. Both variables consist of three categories and as a result, the appropriate way to further examine these is a one-way Analysis of Variance (ANOVA), which has the aim of analyzing, "*...whether three or more means are the same, so it tests the null hypothesis that all group means are equal*" (Field, 2009, p.349).

Regarding the variable Type of Museum, the descriptive output of the ANOVA (Table IX) shows a relatively equal Innovation Index mean (AAH=5.86, STE=4.38, OT=5.41) for the different types, which is already an indication for a non-significant and rather weak difference in variance between types. Undoubtedly, the mean comparison of the Index within the Country variable is more striking. Great Britain clearly is on top with regard to the Innovation Index (M=7.61), followed by Austria (M=4.58) and Switzerland (M=3.75). The bivariate relation between Country and Innovation Index as well as the differences in means suggest that this predictor has a relevant influence on the outcome.

Table IX – One-way ANOVA Type of Museum & Country

	N	Mean	SD	F	p	Mult. Comp. [LSD]	p
Art (AAH)	83	5.86	2.759	2.986	.053	AAH vs. STE	.016*
Science (STE)	24	4.38	2.242			AAH vs. OT	.306
Other (OT)	64	5.41	2.593			STE vs. OT	.103
Total	171	5.48	2.662				
Austria	45	4.58	2.331	63.496	.000**	AT vs. CH	.039*
Switzerland	59	3.75	1.917			AT vs. UK	.000**
United Kingdom	67	7.61	1.883			CH vs. UK	.000**
Total	171	5.48	2.662				

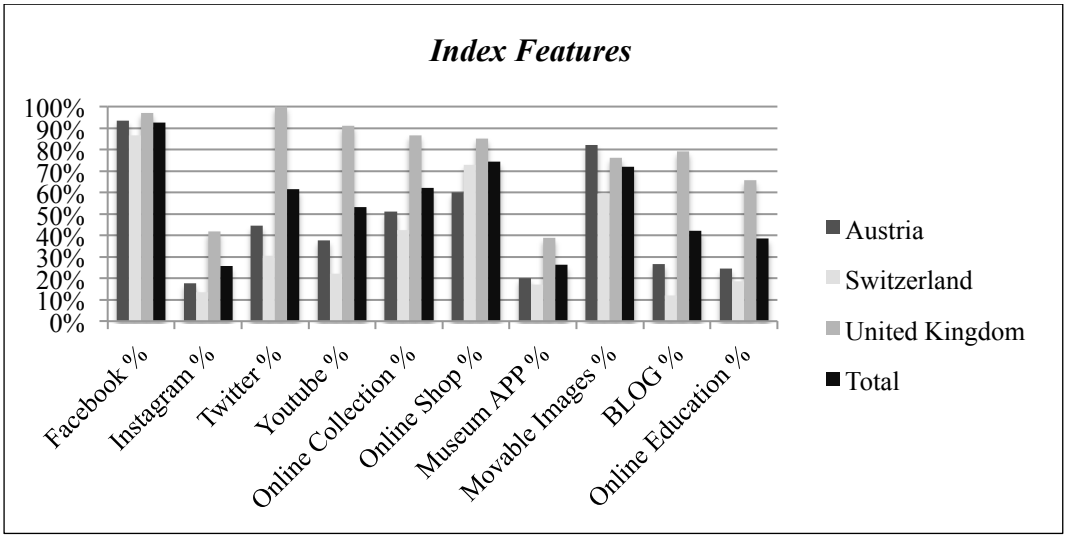
*p<.05, **p<.001

The results of the one-way ANOVA mainly conform to the analysis above – there is only a slightly significant effect of Type of Museum on the Innovation Index [(F(2,168)=2.986, p<.1]. Post-hoc comparisons using the LSD test show that there is a significant difference between Art, Archaeology and History Museum (AAH) and Science and Technology Museum (STE), but no significance of the variation between the samples Art, Archaeology and History Museum (AAH) and Other Type (OT). This result gives a first hint at a weak impact of the variable Type of Museum on Innovation and does not support *Hypothesis 3*.

However, the ANOVA analysis concerning Country shows a highly significant effect of Country on Innovation Index [(F(2,168)=63.496, p<.001). The more in-depth results of the LSD test highlight the significant differences (p<.001) between the United Kingdom and Austria, as well as the United Kingdom and Switzerland. Surprisingly, there is also a significant variation of the Innovation Index between Austria and Switzerland (p<.05).

Furthermore, Diagram I provides an interesting insight into the country-specific adoption levels of the individual Index features with the leading position of British museums. In 9 out of 10 cases Great Britain is the best performer and frequently far ahead of the Alpine nations with Twitter, Youtube, Blog and Online Education presenting the most notable national differences. Thus, they can be seen as crucial factors for the contrasting scores. Particularly interesting is the analysis of the least often adopted features (apart from social media), which are Museum App (total of 26%) and Online Education (total of 39%). The adoption level of museums in the United Kingdom (App=39%; Online Education=66%) is on average more than double than it is in the other countries (Average App=18%; Average Online Education=20%). As stated earlier, both features, mobile technology and online education, will be crucial services for online museums in the future – another indicator of higher innovativeness in Great Britain. As a result, the observed results of the variable country give first indications of the acceptance of *Hypothesis 4*, which expects museums in the UK to be more innovative than its Alpine competitors.

Diagram I - Adoption Rate of Innovation Index Features

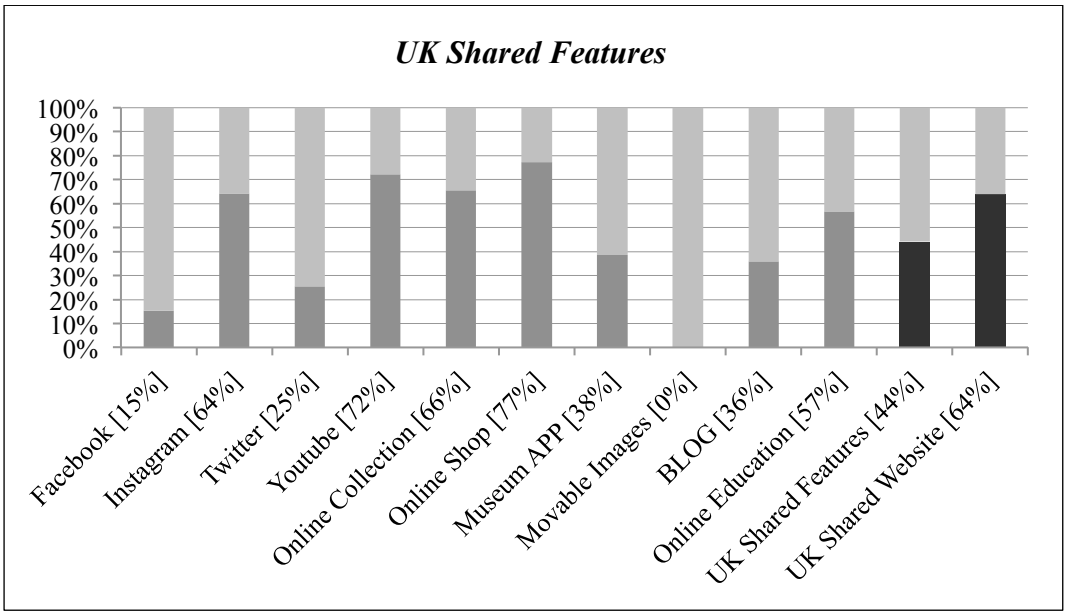


4.2.2 Shared Websites and Competition

The analysis above highlights the fact that museums in the United Kingdom certainly outperform institutions in Austria or Switzerland in terms of the Innovation Index. However,

the question as to the possible reasons for this performance remains. During data collection the researcher observed one crucial factor, namely, museum networks and sharing of services with other museums in the same city or the same owner, for example. More precisely, Diagram II shows that on average 64% of the main websites and 44% of all existent website features of the British museum sample are shared and the most commonly shared ones (besides social media) are Online Shop (77%) and Online Collection (66%).

Diagram II – Adaption Rate of Shared Features/Websites in the United Kingdom



As this strategy of sharing is only present in the UK sample, it can be hypothesized that the shared features have an effect on the Index score. To further test the impact of shared online presence on general innovativeness, an Independent T-Test was conducted (Table X).

Table X – Independent T-Tests of Shared & Not-Shared Websites

		F	p	t	df	p (2-tailed)
All Countries	Equal variances assumed	4.607	.033*	-7.498	169	.000**
	Equal variances not assumed			-8.667	96.762	.000**
United Kingdom	Equal variances assumed	.272	.604	-.904	65	.369

*p<.05, **p<.001

It reveals that there is a significant difference in the scores for Shared (M=7.77, SD=1.824) and Not-Shared (M=4.64, SD=2.465) [t(96.762)=-8.667, p<.001]. However, with regard to the results for Shared and Not-Shared websites within the UK, the Independent T-Test does not report significant differences (Shared M=7.77, SD=1.757, Not-Shared M=7.33, SD=1.993, t(65)=-.904, p>.05).

In addition, a one-way ANOVA was conducted to compare the effects of Country on Competition, with the aim of discovering if museums in the UK are exposed to stiffer competition than museums in the Alpine nations and are forced to be more innovative (Table XI). Surprisingly, the descriptive analysis shows the highest Competition mean in Austria. With regard to the ANOVA analysis, there is a statistically significant difference between groups [$F(2,168)=6.542$, $p<.05$]. Interestingly, the outcome of the post-hoc test does not report significant differences in the level of competition between the United Kingdom and Switzerland ($p>.05$), but between the United Kingdom and Austria ($p<.05$) and unexpectedly between Austria and Switzerland ($p<.001$).

Table XI – One-way ANOVA Competition

	N	Mean	SD	F	p	Mult Comp (LSD)	p
Austria	45	9.13	8.989	6.542	.002*	AT vs. CH	.000**
Switzerland	59	4.90	3.849			AT vs. UK	.020*
United Kingdom	67	6.45	4.778			CH vs. UK	.146
Total	171	6.62	6.127				

*p<.05, **p<.001

As a result, although the variable Shared Website might be a reason for better scores in the Innovation Index and therefore also for innovativeness in British museums, neither Shared Website nor Competition can clearly explain the outstanding and leading performance of British museums.

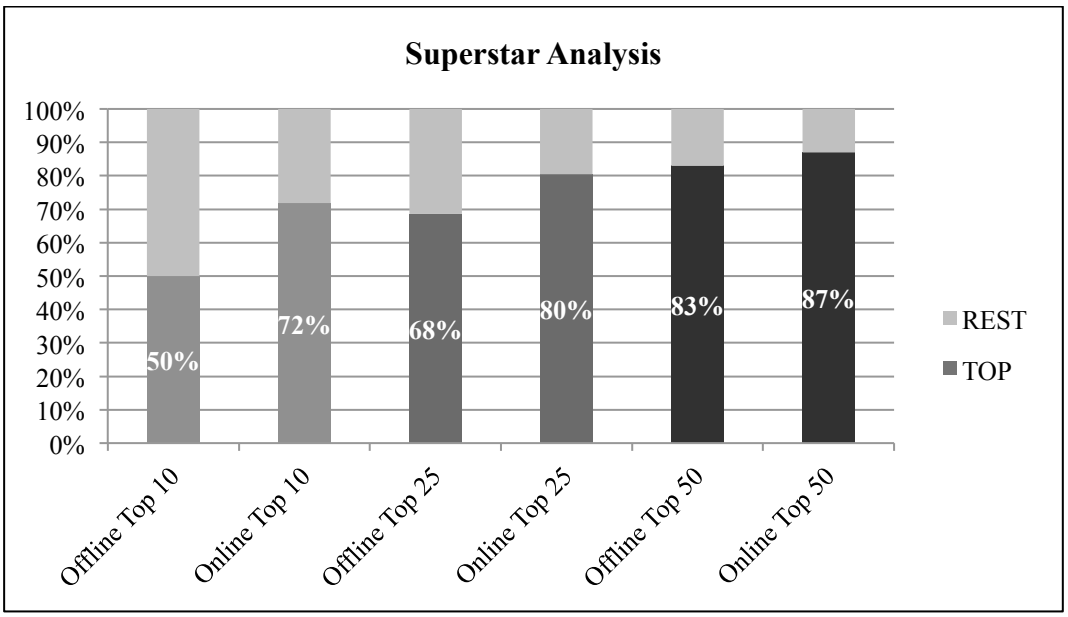
4.2.3 Size and Social Media

In line with the literature and analysis of the collected data, the researcher concentrated on a deeper investigation of the phenomena of superstar museums. Whereas big museums capture the bulk of the offline market share, the question arises whether their share of the online market is similar to their offline power. Based on the collected data, the total offline market share of the investigated sample size equals more than 72 million visitors. As Diagram III demonstrates, the ten biggest museums (TOP 10) account for more than half of the offline market share (50%). Interestingly, by assuming Facebook Likes[2] as an online equivalent to offline visitors, these TOP 10 museums take 72% (+22%) of the online market share. These numbers underpin a striking result, as big museums not only have the major offline market share, but also score an even higher online market share. It is also worth mentioning that these TOP 10 museums are institutions located solely in the United

[2] The researcher decided to only take Facebook Likes as a reference because it is the social media portal with the highest average adoption rate of 92% - more information on the adoption rates can be seen in Table XII

Kingdom. Besides the performance of the TOP 10, Diagram III shows the offline and online market share of TOP 25 and TOP 50 museums. The former accounts for 68% of the total of offline visitors and 80% (+12%) of total Facebook Likes, while the latter represents 83% of offline as compared to 87% (+4%) online market share. Finally, the results of the average Innovation Index and average Facebook Start Time of TOP 10 (M=9.5, M=Q4/08), TOP 25 (M=8.4, M=Q2/09) and TOP 50 (M=7.88, M=Q4/09) are far higher than the overall means (M=5.42, M=Q3/10) reported and also confirm the influence of size on innovation.

Diagram III – Superstar Analysis of TOP 10, TOP 25, TOP 50 Museums



The analysis of the variable Size corroborates the literature on superstar museums, namely, that they reach a high number of people, are visitor attractions and account for a huge share of the total market. It illustrates the striking fact that, although parts of the literature on ICT predict the spread of the market share from only a few superstars to the long tail of the market (Anderson, 2004), these institutions have an even bigger share of the online market.

Table XII visualizes three relevant aspects of the data on Facebook, Instagram, Twitter and Youtube portals. The first column shows the percentage of adoption for each portal and country, the second, the mean of Likes and the third column the mean of Start Time (in a quarterly period). The descriptive analysis already indicates and confirms essential market facts. Firstly, Facebook (92%) is by far the most frequently adopted social media portal for museums in all countries, followed by Twitter (61%) and Youtube (53%), while the least often adopted is Instagram (26%). Once again, with regard to all portals, the British museum market is on top with an adoption rate of Facebook, Twitter, as well as Youtube above 90%.

Secondly, the average Likes of each social media portal show that on average the mean of Likes of British museums is at least six times higher than that of the museums in the Alpine nations. Last but not least, the third column stresses a considerable earlier date in the UK, particularly with regard to Facebook and Youtube. Undoubtedly, British museums were early adopters of social media. As can be seen throughout the analysis of the thesis, there is no notable difference between the Austrian and Swiss Start Time. In most cases, Austrian museums have implemented Social Media platforms slightly earlier than Swiss museums.

Table XII – Descriptives Social Media

	Facebook			Instagram			Twitter			Youtube		
	%	Likes*	Time*	%	Likes*	Time*	%	Likes*	Time*	%	Likes*	Time*
AT	93%	9835	Q3/10	18%	709	Q2/14	44%	2111	Q4/10	38%	261	Q4/10
CH	86%	3948	Q2/11	14%	870	Q3/13	31%	1052	Q4/11	22%	105	Q2/11
UK	97%	66405	Q4/09	42%	31678	Q3/13	100%	101280	Q2/10	91%	3600	Q3/08
Total	92%	31208	Q3/10	26%	20446	Q4/13	61%	65209	Q3/10	53%	2439	Q3/09

Note. These numbers are average values

Social media is certainly a very common tool in the museum world, however, there still are marked differences. The results prove that British museums are clearly innovative and early adopters of social media and are technological leaders on the market. Based on the data and its differences, one is able to make assumptions concerning the various levels of innovativeness of museums. In order to investigate which independent variables of the research are predictors of the dependent variables that represent innovativeness, the study moves on to further multivariate tests. Due to the fact that Facebook is by far the most used social media portal, the statistical regression analyses with regard to social media focus on Facebook data.

4.3 REGRESSION ANALYSIS

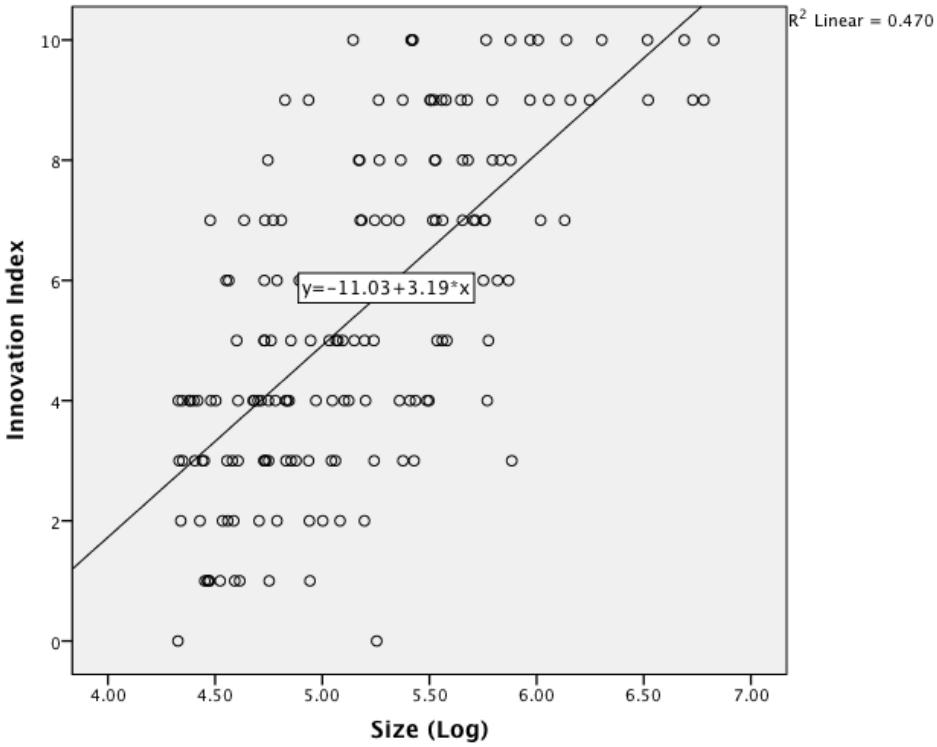
4.3.1 Linear Regression Innovation Index - Size

A closer look at the role of Size for the Innovation Index confirms descriptive data discussed, Size has a significant positive effect on Innovation. A simple linear regression offers further evidence of its importance. The slope of the equation indicates that for each additional unit of Size (logarithm) the Innovation Index increases by more than three units. Moreover, Size explains a significant proportion of variance in the Innovation Index with R^2=.470 [F(1,169)=150.072, p<.001] and the standardized beta highlights the positive

relationship between the variables (β=0.686, p<.001). It can be said that bigger museums are more innovative than smaller based on the definition of visitors per year.

$$\text{Innovation Index} = b_0 + b_1(\text{Size(Log)})_i = -11.03 + 3.189\ (\text{Size(Log)})_i$$

Figure I – Regression Line Size



4.3.2 Multiple Regression Innovation Index

Before conducting a hierarchical multiple regression it was necessary to check the main assumptions in order to guarantee an unbiased model. The score of the Durbin–Watson test of 2.001 confirms the assumption of uncorrelated (independent) residual values (Field, 2009). The multicollinearity test met the requirements as well, it revealed individual tolerance values below 1 and individual VIF values between 1 and 2 and an average value close to 1. Additionally, as the Pearson Correlation displays no correlation value r above 0.6, the assumption of uncorrelated, independent variables is proved. Finally, the researcher carried out further tests to check the data for homoscedasticity, normality and linearity, and the histogram and scatter plots proved that all requirements are met (Field, 2009).

The significant positive as well as negative correlations between Size (Pearson's r=.686, p<.001), UK vs. CH (Pearson's r=-.474, p<.001) and Innovation Index are already a sign of their strong prediction power. It is important to note that all four models significantly explain the Innovation Index (p<.001) as reported by ANOVA. The fourth model with all the predictors produced the following results: R^2=.627, F(6,164)=45.958, p<.001 - the complete

model explains 62.7% of variance of the Innovation Index. However, as the method was conducted in a four-stage hierarchical manner it is necessary to look at the individual steps. Regarding the first model, the predictor variable Country, UK vs. AT and UK vs. CH, accounts for 43.0% (R^2=.430, p<.001) of the variation in the Innovation Index. This value certainly highlights the substantial role of Country on the online innovativeness of museums. The second step includes Size and reports a significant R^2 change of 15.2% ($R^2\Delta$=.152, p<.001). In total, the characteristics Country and Size predict a considerable amount of the variation of the outcome, with a highly significant prediction power of 58.2% (R^2=.582). Unexpectedly, Type of Museum makes a rather small contribution to the model as indicated by the value of R^2 change of 2.5% ($R^2\Delta$=.025, p<.05). The final step adds Competition to the model. This independent variable clearly constitutes a unique contributor and significantly adds 2.0% ($R^2\Delta$=.020, p<.05) to the model.

Table XIII – Multiple Regression Innovation Index

		b	β	t
Model 1				
	United Kingdom vs. Austria	-3.034	-.503	-7.790**
	United Kingdom vs. Switzerland	-3.866	-.692	-10.716**
Model 2				
	United Kingdom vs. Austria	-2.148	-.356	-6.077**
	United Kingdom vs. Switzerland	-2.122	-.380	-5.548**
	Size (LOG)	2.235	.481	7.787**
Model 3				
	United Kingdom vs. Austria	-2.071	-.344	-5.987**
	United Kingdom vs. Switzerland	-2.242	-.402	-5.816**
	Size (LOG)	2.172	.467	7.697**
	Art (AAH) vs. Science (STE)	-1086	-.142	-2.755*
	Art (AAH) vs. Other (OT)	-.722	-.132	-2.466*
Model 4				
	United Kingdom vs. Austria	-2.393	-.397	-6.735**
	United Kingdom vs. Switzerland	-2.356	-.422	-6.220**
	Size (LOG)	1.880	.404	6.412**
	Art (AAH) vs. Science (STE)	-.857	-.112	-2.182*
	Art (AAH) vs. Other (OT)	-.602	-.110	-2.081*
	Competition	.069	.159	2.950*

Note. R^2=.43 for Model 1, p<.001, $R^2\Delta$=.15 for Model 2, p<.001, $R^2\Delta$=.03 for Model 3, p<.05, $R^2\Delta$=.02 for Model 4, p<.05; *p<.05, **p<.001

The final equation of the model consists of the following variables (unstandardized coefficients):

$$\text{Innovation Index} = b_0 + b_1(\text{UK/AT})_i + b_2(\text{UK/CH})_i + b_3(\text{Size(Log)})_i + b_4(\text{AAH/STE})_i + b_5(\text{AAH/OT})_i + b_6(\text{Competition})_i$$

$$= -2.920 - 2.393\ (\text{UK/AT})_i - 2.356\ (\text{UK/CH})_i + 1.880\ (\text{Size(Log)})_i - 0.857\ (\text{AAH/STE})_i - 0.602\ (\text{AAH/OT})_i + 0.069\ (\text{Competition})_i$$

It provides an interesting insight into the role of each museum characteristic. On the one hand, when controlling for other variables, it shows the highly positive relationship between the predictors UK, Size and the dependent variable Innovation Index. On the other, the equation reveals the smaller positive influence of Competition and Type of Museum. Due to the different types and units of variables, the standardized betas (Table XIII) offer a superior method of comparison (Field, 2009) and confirm the observed relation stated in the equation that all independent variables are unique contributors to the prediction of the outcome variable.

The multiple regression is in line with previous analyses and confirms expected as well as unexpected results. The variables Country and Size have sizeable influence on the Innovation Index and therefore *Hypothesis 1* and *Hypothesis 4* can be accepted. As expected, Type of Museum and Competition only play a minor role, but both variables are significant contributors to the Index.

4.3.3 Multiple Regression Facebook Start Time

A hierarchical multiple regression was conducted in order to examine the relationship between the variable Facebook Start Time and the predicting variables. Similarly to the multiple regression above, the assumptions were tested and met. The model, including all the independent variables, generates the following result: R^2=.319, F(6,148)=11.575, p<.001. The predictors explain 31.9% of the variance of the outcome variable and interestingly, neither Type of Museum, nor Competition significantly influence the model. By reviewing the separate steps of the hierarchical model, it can be seen that Size is the major factor in predicting Facebook Start Time (R^2=.233, p<.001). Moreover, Country contributes 7.7% to the model ($R^2\Delta$=.077, p<.001), although it only has a slightly significant effect as a unique contributor to the model (p<.01) in Austria. With regard to the effects of the predictors, the standardized beta shows a moderate, negative influence of the variable Size (β=-.283). In addition, when controlling for the other variables, United Kingdom indicates a negative effect on Facebook Start Time (β_{CH}=.353, β_{AT}=.171).

Table XIV – Multiple Regression Facebook Start Time

		b	β	t
Model 1				
	Size (LOG)	-36801914	-.483	-6.826**
Model 2				
	Size (LOG)	-22715247	-.298	-3.647**
	United Kingdom vs. Austria	14046651	.141	1.789
	United Kingdom vs. Switzerland	34063176	.365	4.085**
Model 3				
	Size (LOG)	-23118107	-.304	-3.659**
	United Kingdom vs. Austria	13421342	.134	1.697
	United Kingdom vs. Switzerland	32542621	.348	3.684**
	Art (AAH) vs. Science (STE)	7602476	.061	.851
	Art (AAH) vs. Other (OT)	-1244956	-.014	-.182
Model 4				
	Size (LOG)	-20549730	-.270	-3.032*
	United Kingdom vs. Austria	16770956	.168	1.965
	United Kingdom vs. Switzerland	33659233	.360	3.784**
	Art (AAH) vs. Science (STE)	5787480	.046	.636
	Art (AAH) vs. Other (OT)	-2088540	-.023	-.303
	Competition	-583588	-.082	-1.045

Note. R^2=.23 for Model 1, p<.001, $R^2\Delta$=.08 for Model 2, p<.001, $R^2\Delta$=.01 for Model 3, p> 05, $R^2\Delta$=.01 for Model 4, p>.05; *p<.05, **p<.001

Again, Size has the biggest influence on the outcome variable with an expected negative correlation, which once more strengthens the positive relationship between Size and Innovation, stated in *Hypothesis 1*. Moreover, *Hypothesis 2*, which claims that smaller museums are early adopters of social media networks, has to be rejected. In accordance with the results of the regression analysis with the outcome variable Innovation Index and *Hypothesis 4*, the observations with regards to Facebook Start Time highlight that compared to museums in the Alpine nations, museums in Britain are early adopters of social media.

4.3.4 Multiple Regression Facebook Likes

In this analysis, the variable Facebook Likes represents the online market share and another factor of innovativeness, which is applied as dependent variable of the multiple regression. Unlike the regressions above, this model does not apply the log version of Size, but includes all visitor numbers as they are. Whereas the assumption of multicollinearity is met, showing individual tolerance values below 1 and individual VIF values between 1 and 2, the assumptions of homoscedasticity and linearity are not. The histogram and plots indicate clear deviations from the straight line (normality) and give evidence for heteroscedasticity.

Moreover, the Mahalanobis distance yields several cases above the critical value of 9.49 (0.05–level), as well as the casewise diagnostics reveal outliers with standard deviations that report values above 3 (Field, 2009). Given the limited time frame of this thesis, the cases could not be rectified and because of the outliers and exceptional cases, the results have to be interpreted with caution and should not be generalized.

Table XV shows the following results: R^2=.666, F(6,151)=50.277, p<.001. The significant effect of Size on the dependent variable Facebook Likes (R^2=.658) is most striking. All other independent variables do not significantly contribute to the model and only have a moderate effect on the total R^2. This result is crucial and in line with the multiple regression of Facebook Start Time - based on a bivariate analysis, most of these variables report notable differences, however, controlling for other variables in the model, none of these is a significant contributor to the model.

Table XV – Multiple Regression Facebook Likes

		b	β	t
Model 1				
	Size	.090	.811	.000**
Model 2				
	Size	.091	.819	.000**
	United Kingdom vs. Austria	257859	.001	.984
	United Kingdom vs. Switzerland	7182374	.031	.575
Model 3				
	Size	.089	.803	.000**
	United Kingdom vs. Austria	414178	.002	.975
	United Kingdom vs. Switzerland	2757694	.012	.838
	Art (AAH) vs. Science (STE)	-19899935	-.063	.204
	Art (AAH) vs. Other (OT)	-16887916	-.075	.158
Model 4				
	Size	.088	.791	.000**
	United Kingdom vs. Austria	-2835605	-.011	.839
	United Kingdom vs. Switzerland	2610973	.011	.847
	Art (AAH) vs. Science (STE)	-17999153	-.057	.257
	Art (AAH) vs. Other (OT)	-16000406	-.071	.184
	Competition	691482	.039	.463

Note. R^2=.658 for Model 1, p<.001, $R^2\Delta$=.001 for Model 2, p>05, $R^2\Delta$=.006 for Model 3, p> 05, $R^2\Delta$=.001 for Model 4, p>.05; *p<.05, **p<.001

Once more the researcher focuses on the role of Size on innovativeness. While controlling for all other independent variables, the adjusted coefficient beta (Formula I) reveals the impact of Size on Facebook Likes.

*Formula I - b_{adj} = b * Mean Coefficient = 0.088*13.34 = 1.1734*

Formula II - Mean Coefficient[3] = Mean Size/Mean Facebook Likes = 421,682.08/31,207.79 = 13.34

It shows not only the positive contribution to, but also the disproportionate effect on the outcome. If the independent variable Size increases by one, the dependent variable Facebook Likes grows more than one unit. Certainly, big museums have an even higher contribution in the online than in the offline market. This result confirms the bivariate Superstar Analysis, discussed in 4.2.3 - the online market share of superstar museums, represented by Facebook Likes, surpasses the offline market share in terms of visitors per year.

[3] In order to be able to compare the variables and to appropriately interpret the proportional effect, the researcher compensated the unequal relation between Size (Mean=421,682.08) and Facebook Likes (Mean=31,207.79) by calculating the quotient of means of these two variables. Then, the result is multiplied by the coefficient beta (b =.088).

5 CONCLUSION

This thesis intended to investigate the characteristics that influence the online presence of museums with regard to their innovative ICT usage and more precisely, their websites and social media platforms. Based on past research and literature, the researcher aimed at detecting the relationship between the independent variables Size, Type of Museum, Country and Competition, and the dependent variable innovation, which is represented by the Innovation Index, Facebook Start Time and Facebook Likes. The results of the website content analysis support and confirm existing research and highlight further new and relevant information for the museum world.

5.1 LIMITATIONS

Before analyzing the outcomes of this research, though, it is crucial to consider its shortcomings and limitations. First of all, it has to be mentioned that large organizations, businesses, and in the case of this thesis, museums generally offer more services and are more active than their smaller competitors. During the interpretation of the results, this disadvantage has to be kept in mind and conclusions on the influence of Size on innovativeness have to be drawn with care. Moreover, although the quantitative approach of website content analysis is a reasonable method for this study, has many advantages and leads to logical, comparable and comprehensible results, its shortcomings still have to be noted. Website content analysis offers an objective and quantifiable result. The researcher is able to compare various websites that are all examined according to the same rules and guidelines. At the same time, however, this is a major limitation. For example, this study does not look at the content or meaningfulness of the offered online education, the posts of a blog or the posts of social media portals. In addition, the researcher decided to only look at the adoption of certain services at a certain time, the design of these services and their development over time were not considered. Accordingly, the innovation index does not take into account the extent of the features. These deeper and more detailed analyses could also be interesting indicators for the innovativeness of museums. What is more, the data collection of social media portals is restricted to a certain point in time – clearly, a comparison and analysis of activity levels over a prolonged period would have also been interesting.

Besides these shortcomings, the researcher is aware of the fact that the Innovation Index does not include all the possible features that can be found on websites. When considering various kinds of services, a choice was made between different features of sections on websites and a diverse sample of social media networks. Nevertheless, the

selection could have also included different or more features. And as far as actual data collection was concerned, it was necessary to set rules and define features in order to be able to make decisions, such as what to consider as Shared Website or Online Education. The features are not only restricted to these rules and there might certainly be other reasonable definitions, though. Moreover, the definition of innovative features and innovation in general is not only limited to that contained in this thesis. This also applies to the definition of the variable Competition, which could have also been determined by the demand-side of the museum market (number of visitors). As these numbers already represent the variable Size, the number of museums within one market is a better and more reasonable benchmark for Competition. It does not include the competition with other leisure activities either, which would certainly be an interesting factor worthy of consideration. In addition, the restrictions of the research sample have to be mentioned again. As the choice of museums and visitor number data from the three specific country samples was collected by various organizations, their data collection and information gathering procedures could differ from each other and therefore, fail to result in precisely comparable samples.

Last but not least, the research looks at four important characteristics of museums and the museum world. However, these are clearly not the only ones that are essential and of interest for an analysis of museums and their innovativeness. One characteristic that certainly plays a decisive role in this context is the funding of museums. On the one hand, this factor influences the behavior of museums in general and on the other hand, it might also have interesting impacts on attitudes towards innovation. The researcher is aware of this limitation. However, in view of the time constraints of the thesis, it was necessary to make certain decisions and accept possible drawbacks of the study.

5.2 INTERPRETATION AND CONCLUSION

The variable Size is the major predictor of innovation. The results of the analyses report and confirm this expected result. According to this research, it is not only the biggest contributor to an explanation of innovativeness, but also has the highest impact on innovation. On the one hand, the results are in line with and clearly confirm the literature and past research. On the other, the Superstar Analysis, as well as the multivariate regression with the dependent variable Facebook Likes, reveal very interesting and surprising results. The online market share of superstar museums substantially surpasses their share on the offline market and in relation to the number of visitors Facebook Likes increase disproportionately. Thus, in contrast to the long tail theory of Anderson (2004), this research discovers that ICTs

and the Internet do not necessarily encourage an expansion of the museum market to include the long tail but rather foster and support the power of a few museums. *Hypothesis 1*, saying that bigger museums are more innovative, can certainly be accepted.

Besides the crucial influence of Size, the variable Country plays a central role in predicting innovativeness. The results confirm that British museums are far ahead of the Alpine nations in terms of the innovative adaption of technologies. The data indicate that they not only are the leaders in the majority of categories of website features, but also attain the best results for social media platforms. They have adapted their organizations to social media portals much earlier than Austrian or Swiss museums, have a much higher rate of Likes and the list of TOP 10 museums is filled entirely by the UK. Based on the outcomes of the bivariate analyses as well as of the multivariate regressions with the dependent variables Innovation Index and Facebook Start Time, *Hypothesis 4* can be accepted. However, as the final multiple regression does not report a significant role of Country, this conclusion has to be drawn with caution.

Hypothesis 2, which states that smaller museums are more active regarding their social media usage, has to be rejected. Again, the results of all social media analyses stress that Size plays the central role. The visitor numbers even grow disproportionately in relation to Facebook Likes. As indicated above, social media platforms provide low-cost opportunities for customer reach (Russo et al., 2007). Therefore, smaller museums, and particularly museums of the Alpine nations, would be well advised to adopt and engage more via social media portals. In addition, as development costs for a website or online collection are independent from museum size (Frey, 1998), collaborations with superstar museums or each other (Shared Website/Social Media) could also be extremely relevant for small and medium sized museums. This could result in a sharing of the high fixed costs of setting up an innovative online presence, in positive network effects and ultimately in greater success in the offline market.

Hypothesis 3, which refers to Type of Museum, cannot be accepted, as the bivariate as well as multivariate analyses show no significant or only slightly significant results with a small effect on innovation. These results indicate that museums in general have reached a solid level regarding their online adoptions and appearances. This is a sign that in the meantime most types have realized the importance of innovative ICT usage and caught up with the early adopters. Moreover, the minor positive contribution to the Innovation Index and insignificant impact on Facebook Start Time and Likes indicate the low relevance of Competition, as it is defined in the context of this thesis, for museum innovativeness.

In conclusion, the outcomes of this research contribute to the museum world in various ways. First of all, museum managements should realize the many possibilities of the online market. They are advised to adopt, improve and use website features and social media portals in order to increase the quality and quantity of their online presence and to attract, reach and engage existing and new visitors. Particularly Swiss and Austrian museums should look beyond their boundaries. According to Loran (2005), British museums can be seen as best practice examples (p.28), which is confirmed by the outcomes of this research. Alpine nations should learn from British culture with its affinity for technological progress. Museum collaborations and networks (Shared Websites/Shared Website Features/Shared Social Media), a common strategy in the United Kingdom, should be considered as well, as these could lower the costs of setting up and running the website and entail network effects for the museums thus connected.

Moreover, the thesis confirms the literature on innovation in museums and in general, namely that size is a crucial contributor to innovativeness. In addition, it corroborates research on countries, which play an important role when it comes to innovation. However, as far as the literature on ICT's and their effects is concerned, the results contradict with the long tail theory (Anderson, 2004) but support the superstar theory (Rosen, 1981) - big museums take an even higher share of the online than the offline market.

Last but not least, these results could be an indication and motivation for policy makers to realize the major differences and support and subsidize smaller museums, in order that these are given the chance to follow and compete with the superstars of the online and offline market.

5.2.1 Further Research

With regard to the outcomes, limitations and the conclusion, some suggestions for future research can be made. First of all, it would be interesting to expand the Innovation Index by adding, counting and coding more features as well as analyzing additional social media portals. This would enlarge the field of the definition of innovation, add more innovativeness factors and enable the drawing of more generally valid conclusions. Furthermore, especially as this research detects that Competition and Shared Website do not predict Innovation Index to a large extent, the enlargement of the research and inclusion of funding in the model could be of considerable relevance. Moreover, this quantitative study could be complemented with a qualitative assessment that goes into more detail and analyzes the extent, content and design of the services. These suggestions would contribute to a better

understanding of the influence of market and museum characteristics on the innovativeness of museums. As a result, this would reduce the probability of false conclusions and contribute to more generalizable outcomes.

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