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Assessing the Role of Collaboration in the Process of Museum Innovation

The relationship between collaboration and innovation in cultural organisations is an emerging topic that has drawn particular attention from scholars and practitioners. The main aim of this study is to assess the role of collaboration in the process of innovation in museum organisations. To achieve this aim, first, we develop a four-domain analytical framework by matching innovation types to cultural production processes to reflect the peculiarities of museum innovation. By applying this framework to the multiple case studies from four Spanish museums, we identify three main motivations (supplementing manpower, compensating for the scarcity of knowledge, improving demand-driven innovation) and four forms of collaboration (teamwork, outsourcing, consortium and conversation) and summarise the different modes of collaboration involved in various domains of production and innovation. An assessment is conducted subsequently to evaluate the effectiveness of existing collaborations in achieving technological and cultural innovation in museums. Finally, a list of implications for museums' innovation management is presented.

Keywords: museum, technological innovation, cultural innovation, cultural production, collaboration

Introduction

Innovation management in the cultural and creative sectors has been an emerging topic in recent years, among which the relationship between collaboration and innovation has received particular attention in academia. Overall, it is argued that collaboration is an important driving factor in facilitating the process of innovation in cultural and creative organisations. For example, Castro-Martínez and Fernández-Baca Casares (2012) assert that value-adding innovative products and services result, fundamentally, from extensive collaboration between cultural organizations and diverse knowledge providers at the production, distribution and consumption stages in Spanish heritage institutions. Such collaboration was also observed in new product development in the music

1
2
3 industry: “new early music collection is the result of the collaboration between a record
4
5 company and a public research organization” (Castro-Martínez et al. 2013).

6
7 Additionally, collaboration also improves innovation outputs, for instance, Verbano et
8
9 al. (2008) discovered that Italian restoration firms that collaborated with firms and
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11 universities or research institutions are more likely to adopt new laser technology and to
12
13 be more technologically innovative.
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16
17 As cultural and creative organisations, museums also rely on collaboration for
18
19 innovation. Camarero and Garrido (2012) found that collaboration with other museums
20
21 in joint leisure and cultural activities is a necessary condition for visitor-oriented
22
23 museums to generate technological innovation. Furthermore, Li and Ghirardi (2019)
24
25 pointed out that the contribution of collaboration to museum innovation differs
26
27 depending on the type of innovation, and that different collaborative arrangements also
28
29 have different impacts on the innovation outcomes in museums.
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31

32
33 The literature on this topic is, however, still scarce in comparison with that on
34
35 the subject of innovation; moreover, most are aimed at identifying the relationship
36
37 between collaboration and innovation by means of statistical analysis of the cultural
38
39 organisations. Although these studies have contributed to this topic with many examples
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41 and evidence supporting possible causation between them, it is still unclear from
42
43 existing literature how collaboration fits in the process of museum innovation.
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45

46
47 Therefore, where prior studies can be viewed as exploring the ‘know-what’
48
49 knowledge, this study attempts to expand ‘know-how’ knowledge, and for that reason
50
51 this article will concentrate mainly on two issues: (1) identifying the modes of
52
53 collaboration involved in the process of innovation and production in today’s museum
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55 organisations; and (2) assessing the effectiveness of these modes in driving museum
56
57 innovation.
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Collaboration as a Driving Factor of Innovation

Collaboration can be defined as the mutual engagement of participants in a coordinated effort to solve the problem together, wherein collaborators share some common objectives in the clear division of labour. Collaboration is a pattern of action that often requires actors to cooperate with both insiders, e.g., workers in cross-functional teams, and outsiders from outside of the organisation to look for new knowledge (Granados and Pareja-Eastaway, 2019) and thus, fostering a networked environment to achieve some complex goals (Thomson *et al.* 2009), such as innovation. Because collaboration can be better at motivating effort and can allow creative people to work on projects more efficiently than would traditional mechanisms (Benkler, 2006), there is an increasing argument that collaboration could be an effective organisational strategy for improving project performance and innovation in a wide range of sectors, for example, from agriculture (Compagnucci and Spigarelli, 2018) and manufacturing (Schroth and Häußermann, 2018) to service (Ruiz-Torres *et al.*, 2018), and cultural and creative sectors (Castro-Martínez, Recasens and Jiménez-Sáez, 2013; Li and Ghirardi, 2018). In addition, a recent study pointed out that there are inverted U-shaped relationships between collaboration breadth and radical innovation performance and between collaboration depth and incremental innovation performance (Kobarg, Stumpf-Wollersheim and Welp, 2019), which further reinforces such argument that collaboration can foster innovation.

Innovation is the multi-stage process of transforming ideas into new/improved products, services or processes, in order to advance, compete and differentiate organisations successfully in the marketplace (Baregheh *et al.* 2009). This definition can be understood in two aspects. On the one hand, the “novelty” of innovation can be measured by technological/functional improvement, meaning generation, or changes in

1
2
3 organisational structure (Stoneman, 2010) and thus, categorising innovation into
4
5 technological, cultural and organisational dimensions accordingly. On the other hand,
6
7 successful commercialisation does not always mean the pursuit of economic benefit, but
8
9 also for the purpose of delivering a social benefit, which especially occurs in arts and
10
11 cultural organisations. Whilst admitting that the process of cultural production may
12
13 involve changes in technology/function and organisational structures, the distinction
14
15 between the cultural and creative sectors from the rest is creativity, and the generation
16
17 or communication of symbolic meaning involved in mass production (Galloway and
18
19 Dunlop, 2007). Therefore, innovation in arts and cultural organisations displays special
20
21 features as opposed to the technological and functional dimensions and these features
22
23 can be summarised as (1) content creativity (Handke, 2004), wherein creativity and
24
25 other modes of innovation may feed into each other; (2) hidden innovation (Miles and
26
27 Green, 2008), which is not registered by traditional innovation indicators and is
28
29 reflected, mostly, in novel combinations of existing technologies and processes, and
30
31 innovative problem-solving; and (3) soft innovation (Stoneman, 2010), which primarily
32
33 impacts upon the aesthetic or intellectual appeal rather than how it performs at a
34
35 functional level.
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42 Collaboration typically takes place within and between organizational structures.
43
44 Early innovation literature used to emphasise internal collaboration in Research and
45
46 Development (R&D) at large corporations, Schumpeter Mark II pattern (Schumpeter
47
48 1942 cited Malerba and Orsenigo 1995) is an example; whilst, in turn, recent literature
49
50 stresses external collaboration by the adoption of external knowledge and technologies
51
52 in an open innovation environment, as proposed by open innovation theory
53
54 (Chesbrough 2003a). Due to the objectives of our study, this article focuses on external
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56 collaboration.
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1
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3 In general, external collaboration comprises two types of interaction: user-
4
5 producer and supplier-producer. User-producer interaction describes the collaboration
6
7 between producers and potential users so as to transmit information about the in-use
8
9 value of the new characteristics of a product to the final users of the innovation
10
11 (Lundvall 1988); supplier-producer interaction focuses on the collaboration between
12
13 upstream and downstream industries, as well as the integration of production, education
14
15 and research activities in the innovation system (Fagerberg 2006). As far as museums
16
17 are concerned, ‘users’ are always people – both, cultural creation and utilisation of new
18
19 technologies, are at the service of the users; yet, the ‘supplier’ side refers to knowledge
20
21 producing institutions that provide the knowledge and technologies necessary for
22
23 production and innovation (Li and Ghirardi 2019), e.g., technology firms (Verbano *et*
24
25 *al.* 2008), universities (Zukauskaite 2012), and research centres (Castro-Martínez *et al.*
26
27 2013).

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32
33 According to the innovation literature, the dependence of innovation on
34
35 collaboration can be explained by the following considerations: first, in an economy
36
37 characterized by the vertical division of labour and by ubiquitous innovation, a
38
39 substantial part of innovative activities take place in units separated from the users of
40
41 innovation, therefore, successful innovation requires collaborative learning for
42
43 knowledge about the needs of potential users (Freeman *et al.* 1982, p. 124, Lundvall
44
45 1988); second, given enormous cost of R&D is enormous, it is more cost-efficient for
46
47 organisations to implement external R&D outcomes developed and patented by other
48
49 firms and offered to the market through licensing agreements, joint ventures and other
50
51 arrangements (Chesbrough 2003b); third, inter-firm collaboration can help share the
52
53 costs and rewards of developing innovative activities, and thus mitigate somewhat the
54
55 risks associated with the innovation process (Bureth *et al.* 1997). Here the first element
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1
2
3 concentrates on user-producer interaction whilst the latter two emphasise supplier-
4
5 producer interaction.
6

7
8 In sum, innovation is an interactive process involving the transfer and creation
9
10 of knowledge through organizational learning (Harkema 2003) and collaboration is an
11
12 important means of knowledge exchange through direct interaction with users and
13
14 suppliers (Bureth *et al.* 1997, Martin and Moodysson 2011).
15

16
17 However, the above explanation cannot be applied directly to the cultural and
18
19 creative sectors or three reasons. First, the creative economy in many countries consists
20
21 predominantly of small and medium-sized enterprises (SMEs) (UNCTAD 2008), which
22
23 may lack the ability to innovate, or the capacity to contribute scarce internal resources
24
25 to a collaborative project. Second, innovation literature typically focuses on R&D and
26
27 technological innovation over cultural innovation, which is further stressed by cultural
28
29 organisations studies (Castañer 2014). Third, many art and cultural organisations are
30
31 both cultural production units and experience sites, and thus, entailing extra features in
32
33 terms of experience innovation (Sundbo 2009), which may have an impact on the
34
35 modality of collaboration.
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39 40 41 **An Analytical Framework**

42
43 Based on the previous discussion, it is reasonable to address the interrelation between
44
45 collaboration, innovation and production to set the context of our study. On the one
46
47 hand, while innovation commonly takes place in the process of production, the
48
49 production itself is a process based on the repetition of certain routines developed from
50
51 prior innovation (Lundvall 1988); on the other hand, collaboration is always dependent
52
53 on the environment of innovation and production where it evolves.
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57 It is for this that, in order to identify and assess the role of collaboration in
58
59 museum innovation, it is first necessary to define an appropriate analytical framework
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1
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3 based on the process of production and innovation that takes into account the specific
4
5 characteristics of the museum organisations.
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7
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9 ***Cultural Production and Experience***

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11 In terms of the production process, museums display a dual nature: (1) productive units
12
13 (Johnson and Thomas 1998), they manufacture products by which consumers can
14
15 construct distinctive forms of individuality, self-affirmation and social display (Scott
16
17 2004); (2) they also are public experience institutions (Sundbo 2009) and, supply an
18
19 entertainment, edification and information-based experience (Scott 2004). Experience is
20
21 simultaneously co-produced with consumers through their engagement with the process
22
23 of consumption (Hauknes 1998) and is mostly exemplified in intangible services such
24
25 as visiting exhibitions, participating in educational events, buying at museum shops and
26
27 using catering services, both online and on site.
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32 Production and experience in a museum can be seen as two separate functions
33
34 largely contained within different functional activities in the museum organisation.
35
36 Conservation, exhibition, research and education are functional activities relating to
37
38 production whilst communication and visitor service are associated with the experience
39
40 side. For example, an exhibition is a cultural product, but visiting the exhibition is an
41
42 experience because the process of visiting is, usually, a ‘mental journey’ (Sundbo 2009)
43
44 delivering new knowledge or simple spiritual pleasure. Therefore, the utility of this
45
46 experience is often evaluated at the individual level, depending on whether his or her
47
48 needs were met or not. This requires suppliers of experience, i.e. museums, to segment
49
50 their offer to reflect the interests of different stakeholder groups.
51
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55 Production and experience place different demands on museum innovation. If
56
57 innovation in production is more or less similar to R&D and new product development,
58
59 innovation in experiences is mostly based on quick ideas and employee and customer
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1
2
3 involvement and on customer-oriented problem-solving (Sundbo 2009). A market
4 orientation strategy encourages museums to transform conventional curator-oriented
5 production to visitor-oriented production (Camarero and Garrido 2012), thus
6 strengthening the vital role of user-producer interaction in fostering innovation in
7 cultural production.
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16 ***Technological and Cultural Innovation***

17 From a knowledge-based perspective, innovation is a process of knowledge creation
18 (Plessis 2007), which mainly involves three bases of knowledge, namely, analytical,
19 synthetic and symbolic, in the creative sectors (Asheim and Coenen 2005, Asheim,
20 Coenen and Vang, 2007). In detail, an analytical knowledge base comprises
21 predominantly scientific knowledge, wherein knowledge creation is based on cognitive
22 and rational processes, or on formal models; a synthetic knowledge base comprises
23 predominantly engineering knowledge, wherein knowledge creation usually relies on
24 the accumulation and combination of existing knowledge in the course of seeking
25 problem-solving solutions; a symbolic knowledge base comprises meaning, desire,
26 aesthetic, quality, affect, intangibles, and symbols, and knowledge creation often refers
27 to the creation of cultural meaning through transmission in an affecting sensuous
28 medium.
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45 Concerning arts and cultural organisations, therefore, innovation can be
46 classified generally into two types in terms of the predominant knowledge base on
47 which an innovative activity is based (Li and Ghirardi, 2018), i.e., technological
48 innovation is mostly based on analytical and synthetic knowledge bases whilst cultural
49 innovation is defined by symbolic knowledge base. Furthermore, they can be embodied
50 in diverse forms according to some scholars. For example, technological innovation at
51 least involves the use of external technologies (Costa Barbosa 2013) and internal R&D
52 (De-

1
2
3 Miguel-Molina *et al.* 2013) and cultural innovation is often embedded in new cultural
4
5 product development (Castañer and Campos 2002, Castañer 2014) and arts and
6
7 humanities research (Bakhshi *et al.* 2008).
8
9

10 Based on the above discussion, we think such a taxonomy of innovation also can
11
12 be applied empirically in museum organisations in terms of different disciplines on
13
14 which museum staff are trained. Take Spanish museums as an example, as exhibited in
15
16 figure 1, despite a wide range of disciplines, Spanish museums comprise mainly four
17
18 knowledge bases – symbolic knowledge (83.8%), managerial knowledge (12.1%),
19
20 synthetic knowledge (8.3%) and analytical knowledge (5.5%) – which constitute
21
22 essential intelligent engines for different types of innovation within museum
23
24 organisations. Here we add ‘managerial knowledge’ as competences concerning
25
26 communication abilities, responsive behaviour and negotiation skills, which are
27
28 believed to contribute to organizational innovation (OECD and Eurostat 2005),
29
30 although not the focus of this study. In a few words, knowledge distribution in Spanish
31
32 museums evidences that museums are symbolic knowledge-intensive organisations that
33
34 rate poorly in terms of analytical and synthetic knowledge, which may further imply
35
36 that museum organisations have more capacity for cultural innovation than
37
38 technological innovation.
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44 [Insert figure 1]
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48 ***Matching production process with innovation type***

49
50
51 From the different production processes and innovation types identified above, it is
52
53 possible to classify production and innovation in museums into four areas:
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55

- 56 • Technological innovation in the production domain
- 57
- 58 • Technological innovation in the experience domain
- 59
- 60

- Cultural innovation in the production domain
- Cultural innovation in the experience domain

By doing so, different functional museum activities fall into each different domain, as illustrated in figure 2. For instance, all, digital device and experience, digital museum and exhibition, social media application, intranet, and online ticket and shopping, fall into the upper right corner of the figure, which suggests that they share certain common characteristics of technology adoption and experience innovation and thus, being categorised as an ideal type of experience-based technological innovation.

But this is not to say that all functional activities grouped together are homogeneous in their utilisation of knowledge and the process of value creation; conversely, they are scattered in the domain according to where they fall along the spectrum of the two dimensions in figure 2.

Furthermore, it is important to emphasise that the reality could be more complex than that is simplified here, not only for the diversity involved in the process of knowledge generation and value creation, but also for different goals, means, and conditions to which innovative activities may be subject in practice.

Taking the complicated way in which innovation occurs into consideration, however, it is necessary to conceptualise some theoretical stereotypes in order to construct an analytical framework for exploring the mode of collaboration focusing on specific domains where the different types of innovation take place.

[Insert figure 2]

In the following section, we study the examples of restoration, digitalisation, exhibition and visitor services as vehicles to further discuss the characteristics of innovation associated with each of the domains described above.

Innovation in Four Domains

Restoration

Restoration involves actions taken to modify the existing material and structure of an object in order to return it to a new or original condition. Innovation in restoration means to develop options for material or structural improvements by employing new knowledge and techniques. The areas of action are “colour, form, signs of ageing and de-colouration, the content of salts and contamination, biodegrades, damage and deformation, and signs of usage” (ICOM-CC, 2018), which cover a wide range of analytical knowledge such as physics, biology and chemistry. Yet, the process of restoration relies on the application of synthetic knowledge base, such as laser technology and high-power microscopes. Therefore, restoration is an analytical and synthetic knowledge-intensive activity, in which technological innovation is involved.

Digitalisation

The digitalisation of the museum means the integration of cultural heritage and the digital techniques involved in functional activities to facilitate communication and enhance the visitor experience. Innovation in digital museum practice is mainly encapsulated by the development and utilisation of (1) digital (or digitalised) objects, (2) digital networks, e.g., website construction, (3) digital experience, e.g., 3-Dimensions and Virtual Reality in display, and (4) digital devices, e.g., information kiosks and Quick Respond (QR) codes (Costa Barbosa 2013), which aims at narrowing the distance between museums and their prospective and actual visitors, physically and intellectually, as well as enriching the visiting experience. Therefore, it can be regarded as an experience-based technological innovation.

Exhibition

Exhibitions are hallmark cultural products delivered by museums to their audiences. Considering that an exhibition is “a communication medium based on objects and their complementary elements ... use special interpretation techniques and learning sequences that aim at transmission and communication of concepts, values and/or knowledge” (Herreman 2004), the fundamental nature of museum exhibition is storytelling (Bedford 2001) and innovation in exhibition is exemplified by new storytelling approaches and new concepts, values and/or knowledge transmitted and communicated. The introduction of new technologies in an existing exhibition may improve the visitor experience, but it doesn't alter its nature because technologies cannot create meaning and value. Therefore, innovation in the exhibition can be seen as a production-based cultural innovation.

Visitor services

Museums usually concentrate their “public experience” assets in visitor services, which focus on the provision of an informative, pleasant and comfortable visit to museum-goers in the physical, intellectual and social sense (Woollard 2004). Since public experience is closely related to consumer demand, innovation in visitor services is demand-driven and manages to improve the quality and accessibility of visitor services to different user groups. In museums, visitors' preferences and tourist appeal often constitute tacit and symbolic knowledge embedded in the interpersonal interaction between museums and their audience. For this reason, innovation in visitor services can be regarded as an experience-based cultural innovation.

Data and methodology

This study is based on museums in the Valencia region of Spain. Existing literature

1
2
3 shows that innovation performance differs significantly depending on the country where
4 museums are located (Camarero *et al.* 2011) and cultural policies to which they are
5 subject (Vicente *et al.* 2012). Therefore, such a focus helps to minimise the impact of
6 the variables ‘country’ and ‘policy’ by treating them as control variables.
7
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11
12 Located along the Mediterranean coast of the Iberian Peninsula, the Valencian
13 Autonomous Community is the fourth largest Spanish region in terms of both
14 population size and economic volume. Moreover, it is also the largest region of the
15 country by its museographical resources: a total of 206 museums and museographical
16 exhibitions according to the most recent national survey available, from 2016.
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24 To capture a snapshot of what collaboration in Valencian museums is like, we
25 first conducted a questionnaire survey on all 121 museums registered with the Valencia
26 regional government. From 59 valid responses, the survey discovered a notable
27 polarisation, with intensive inter-museum collaboration and collaboration with
28 universities, and limited cross-sectorial collaboration with high-tech firms,
29 museography-oriented firms, individual specialists, and museum associations. It also
30 threw the important conclusion that different collaboration arrangements have different
31 effects on museum innovation depending on the collaborator and the type of innovation
32 (Li and Ghirardi 2019).
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44 Subsequently, we turned to an in-depth multiple case study based on data
45 collected from four local museums by semi-structured interviews and with participant
46 observation, to further explore and identify actual modes of collaboration involved in
47 the process of museum production and innovation. Yin (2009) argued that case studies
48 are a suitable strategy for how-oriented questions, and multiple-case studies deliver
49 more robust than an individual-case study. The selection of cases was largely based on
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3 theoretical interest and practical convenience. A summary of interviewed museums and
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5 interviewees is given in table 1.
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7 [Insert table 1]
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10 The analysis depended on the analytical framework discussed above and placed
11 particular attention to the process of production and innovation embedded in the four
12 functional activities: i.e., restoration, exhibition, digital museum and visitor services,
13 which reflected technological innovation-dominated production, cultural innovation-
14 dominated production, technological innovation-dominated experience, and cultural
15 innovation-dominated experience, respectively. Induction method is utilised to bring
16 together different organisational behaviours in terms of the motivation, shape, and
17 mode of collaboration.
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28 Lastly, and most importantly, the results of the survey were used to assess the
29 effectiveness of the different modes of collaboration identified in the case study. This
30 option was chosen due to its reliability and validity, as survey results were based on
31 data collected from the same population sample as the cases in this study.
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39 **Findings from Cross-cases Analysis**

40 *The Overview of Four Cases*

41
42 The four were a small municipal natural science museum (C1), a medium municipal
43 ethnology museum (C2), a small contemporary art museum affiliated to a private
44 foundation (C3), and a medium private specialized museum (C4). All of them located in
45 Valencia, the capital city of the Valencia region.
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54 Overall, this case study demonstrated that collaboration was widespread in all
55 four museums, but specific collaboration arrangements varied from case to case.
56
57 Specifically, collaborative activities were strongly dependent on the domain of
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3 production and innovation as well as the director's attitude toward the idea of
4
5 collaboration. A brief description of collaboration in all four cases is summarised in
6
7 table 2.
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10 [Insert table 2]
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12

13 ***The Motivation for Collaboration***

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15 Based on the description of the four cases, it is suggested that the main general
16
17 motivation for collaboration is to make up for a shortage of skilled staff and related
18
19 knowledge. Most museums suffer from a lack of staff because (1) small museums are
20
21 staffed by very few employees, e.g., both C1 and C3 only had two full-time employees
22
23 that fulfil a variety of roles; and (2) mid-sized museums had temporary shortages of
24
25 skilled labour during particularly busy periods, e.g., C2 was understaffed on the
26
27 preparatory phase of exhibitions, with tight deadlines and large amounts of restoration
28
29 work required.
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32

33
34 Because people are the carriers of knowledge, a staff shortage necessarily
35
36 implies a shortage of knowledge too. In our cases, small and private museums were not
37
38 equipped with any professional restorers or IT engineers, so they also lacked analytical
39
40 and synthetic knowledge capabilities. As shown in an earlier survey on Valencian
41
42 museums, only 15% of employees had scientific and engineering backgrounds primarily
43
44 in biology, conservation or restoration. This further supports the argument that
45
46 museums are symbolic knowledge-intensive organizations and don't have an affinity
47
48 with analytical and synthetic knowledge bases on which technological innovations are
49
50 reliant.
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53
54 But the configuration of museum personnel doesn't guarantee the presence of all
55
56 essential knowledge bases. For instance, C2 and C4 relied on external IT contractors for
57
58 specific work even though they were mid-sized museums and had an IT department.
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3 Considering the fact that many museographical activities, like restoration and heritage
4 digitalisation, are technology-intensive and require a high degree of specialization, it is
5 possible there is a mismatch between technical abilities required and the technical
6 capabilities of staff, in which case external collaboration could provide a solution.
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11
12 The third motive might be a consequence of demand-driven innovation. Many
13 directors argued that innovation might support a new strategy aimed at creating value
14 for communities and society and, hence, understanding the needs of community and
15 visitors was the key to success. Taking visitor services as an example: they are involved
16 in any part of a museum where staff can meet the public face to face on a regular basis
17 to provide an informative, pleasant and comfortable visit to museum-goers (Woollard
18 2004), so at its core, innovation in this area means meeting visitor expectations in terms
19 of quality and accessibility. In our cases, all museums engaged in direct interaction with
20 visitors, onsite and online, to improve visitor services, which might suggest that user-
21 producer interaction is a necessary condition to strengthen demand-driven innovation
22 capabilities.
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39 *The Shape of Collaboration*

40
41 Despite many different forms, collaborative practises involved in museums can be
42 grouped by induction into four main categories. The first and most frequent is
43 *outsourcing*. In our study, all museums transferred specific tasks or jobs to external
44 specialists or contracted third-party organisations to source external knowledge and
45 technologies. The outsourced work was mostly technical, auxiliary or service-oriented,
46 such as website development (C3), collection digitalisation (C3), artwork restoration
47 (C2, C3), infrastructure construction (C1, C4). Additionally, the turnkey exhibition
48 model adopted by some museums (C1, C2, C3) could also be seen as outsourcing
49 exhibition-making. Note that outsourcing doesn't mean that museums relinquish
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3 oversight; on the contrary, they remain involved in the co-design, co-work, and
4
5 decision-making in the implementation process. For instance, museums need to provide
6
7 a clear brief to the web design agency, decide what exhibits to digitise and the
8
9 parameters and techniques to be used by IT firms virtualising an exhibition. They are
10
11 also responsible for exhibition design and installation, even when an independent
12
13 professional may have been engaged to curate the new exhibition. In other words,
14
15 collaborative outsourcing (KOT 2008, Ong 2014) benefits knowledge diffusion through
16
17 supplier-producer interaction, and thus, constitutes an important form of collaboration
18
19 in museum innovation.
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23
24 The second form is *teamwork*, based on the creation of joint project teams,
25
26 which comprise museum staff as well as external personnel, and where each plays a
27
28 well-defined role in the delivery of ‘a common goal and clear purpose’ (Harris and
29
30 Harris 1996). In this situation, external knowledge is acquired and disseminated through
31
32 learning by doing in a cooperative environment. C1 shows a typical example of project-
33
34 oriented teamwork between a museum and a university in restoration. The university
35
36 took charge of the design, pilot testing and execution of the repair plan while the
37
38 director, usually in coordination with the head of the university team, decided the final
39
40 solutions to be employed, as well as techniques and materials to be adopted, based on
41
42 the experiment results submitted by the university team.
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46
47 The third form is *consortium*, consisting of an association of two or more
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49 museums to undertake a common activity, or to achieve a common goal by resource-
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51 sharing, as is the case in C3, which benefited from resource-sharing with other members
52
53 of the Consortium of Museums of Valencia Community in the areas of artistic
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55 production, exhibition programming, educational activities and investigation. A
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57 consortium could be established at the national level like ICOM España and Spanish
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3 Association of Museology, or at the local level like the Consortium of Museums of
4 Valencia Community. Although a consortium constitutes an institutional arrangement to
5 promote collaboration, collaboration is somewhat less frequent than could be expected:
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8 (1) only 17% of Valencia museums belong to professional association, and (2) Spain
9
10 doesn't have the equivalent of the Museum Association in the UK, or the Museum
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12 Alliance in the US, which exert substantial influence in their respective regions.
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17 The above three forms of collaboration are based mostly on contractual
18 agreements leading to a relatively stable collaboration mechanism that guarantees
19 effective information exchange and can, therefore, be seen as formal collaborations.
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21 Furthermore, these structures are intertwined: the introduction of an itinerant exhibition
22 can be categorised as outsourcing of exhibition planning and design, while production
23 and installation rely on teamwork between the host museum and the exhibition
24 producer, and these exhibitions are often displayed by different members of the
25 consortium.
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36 There is also collaboration based on frequent communication instead of one-off
37 contractual agreements. For example, visitor's preference and tourist appeal were
38 enquired with museum audience face-to-face (C1, C2, C3, C4); art viewpoints were
39 shared after private communication between curator and art critics (C4); new
40 approaches to restoration were exchanged directly via telephone communication
41 between restorers from different museums during the course of ordinary work (C2).
42 Peacock (2008) argued that the process of museum innovation is a social construction
43 by conservational interaction for the exchange of internal and external flows of ideas. If
44 this is true, then such interpersonal interaction based on daily conversations should also
45 be considered a form of collaboration. Note that *conversational collaboration* is
46 different from aimless chatter and refers to dialogue with a specific purpose. Such
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3 interpersonal conversations are, typically, trust-based, and contribute to overcoming any
4 potential uncertainty and opportunistic behaviours (Lundvall 1988, Chesbrough 2003a).
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8 9 ***Collaboration in different types of innovation***

10
11 Combining these findings, we can posit different modes of collaboration in the four
12 identified domains according to motivate and form of collaboration, as shown in table 3.
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15
16 [Insert table 3]
17

18
19 Regarding technology-dominated innovation, in ‘restoration’ and ‘digital
20 museum’, collaboration is usually meant to compensate for a deficiency in human
21 resources and analytical/synthetic knowledge. Because these practices usually require
22 highly qualified specialists, rarely present in small and even mid-sized museums,
23 collaboration is mostly based on supplier-producer interaction. Among them,
24 outsourcing is the most common form of collaboration in small and mid-sized museums
25 to adopt external knowledge and technology to underpin innovation.
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35 On the other hand, teamwork is not as frequent as outsourcing because
36 successful teamwork relies on team members who have equivalent financial power or
37 scientific and technological competence (Chesbrough 2003a) that small museums
38 usually lack, so teamwork seems to be an alternative collaboration for some museums.
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45 Additionally, conversational collaboration also exists in the restoration
46 department of some museums to deal with solving-problem innovation in their daily
47 work. However, user-producer interaction is less pervasive than could be expected, even
48 in experience-based technological innovation such as digital museum development,
49 which might imply that the pace of the adoption of new technologies is dictated by the
50 availability of new technologies rather than by user demand.
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58 Production-based cultural innovation, like ‘exhibition innovation’, is delivered
59 through new exhibition development by a museum itself and also by hosting external
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3 itinerant exhibitions (e.g. C1, C2, and C3). The latter is consistent with Castañer and
4
5 Campos's (2002) argument that adopting and programming existing artistic and cultural
6
7 forms is an important cultural innovation in cultural organizations like theatres and
8
9 museums.
10

11
12 Collaboration in the process of new exhibition development is mainly demand-
13
14 driven and reliant on the interaction with potential users of innovation - i.e., the
15
16 exhibition audience in this case - to communicate information about concepts, values
17
18 and knowledge of a new exhibition. The audience in an exhibition is not only restricted
19
20 to the public, but also professional communities (such as art critics, colleagues, and
21
22 scholars), which explains in part why many curators share their thoughts and viewpoints
23
24 with art critics and other professional peers during the preparatory phase of an
25
26 exhibition. These exchanges are often private and informal and built on trust. It is just a
27
28 coincidence of the theoretical proposition that symbolic knowledge is “reliant on tacit
29
30 knowledge, craft, and practical skills” that is learnt through interaction in the
31
32 professional community (Asheim *et al.* 2007).
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38 Collaboration in the adoption of new exhibitions, however, tries to mitigate
39
40 deficiency in human and symbolic resources, only because museums that lack such
41
42 resources and knowledge, particularly small museums, have no choice but to collaborate
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44 in order to assemble new exhibitions. Here three scenarios can be identified:
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- 48 (1) Teamworking with external curators (e.g., independent curators and university
49
50 professors in many cases) to curate a new exhibition from the museum's
51
52 collection.
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- 54 (2) Outsourcing the entire exhibition to other museums or cultural organizations.
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- 56 (3) Joining externally promoted exhibitions by resource sharing among consortium
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58 members.
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3 All the above collaborations are characterized by a contractual form of supplier-
4
5 producer interaction.
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8 Finally, all museums are engaged in some form or other of direct interaction
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10 with their visitors, onsite and online, meaning that conversational collaboration based
11
12 on user-producer interaction constitutes the principal mode of collaboration in
13
14 experience-based cultural innovation.
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16 17 18 *Not always collaborating* 19

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21 Museum innovation does not always necessitate external collaboration. Most directors
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23 in the interview indicated that curation is nearly a thought experiment-like process
24
25 involving the personal effort of individual curators, rather than a team effort. For
26
27 example, the sole curator at C3 compared his work to mental mapping:
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31 “When you read books and the Internet, or visit exhibitions and artists, you draw
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33 what you find interesting at just like a conceptual map; then you can arrange these
34
35 ideas in your own manner through such mental diagrams; after making more of an
36
37 effort, you might change all that you have planned theoretically and get new ideas
38
39 totally different from the original” (Interviewee, November 18, 2015, personal
40
41 interview).
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44 The evidence strongly suggests that personal creativity and individual trial-and-
45
46 error practices are important in the process of curating. This might be because the
47
48 exhibition curating is a process of codifying tacit symbolic knowledge through a
49
50 specific storytelling approach and this process usually involves arts and humanities
51
52 research that attaches great importance to the utilisation of the results of the research for
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54 visual presentation. In this process, exhibition curators play a role akin to that of arts
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56 and humanity researchers, who are characterised as “lone scholars” (Bakhshi et al.
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2008). In other words, museum staff prefer working alone to collaborating in arts and human researches.

Assessing the effectiveness of the modes of collaboration

The Basis for Assessment

Our assessment is conducted on the basis of findings extracted from **Author's** (2018) study, which was carried out based on the survey data from 59 samples of a small, definite population of 121 museums registered in Valencia Autonomous Community of Spain. The study explored the relations between collaborative arrangement and innovation outcome in Valencian museums based on one-way ANOVA approach, which was utilised to determine if there were differences in innovation outcomes between museums that did, or did not, collaborate with specific actors. The conclusion was reached that the contribution of different collaborative arrangements to museum innovation differs statistically depending on the type of innovation. Specifically, the three main finding on which our assessment is based are generalised as follows:

- Collaboration with universities and high-tech firms, as well as inter-museum collaboration enhance technological innovation.
- Joining professional associations improves cultural innovation.
- Neither technological nor cultural innovation benefits from collaboration with museography-oriented firms or individual specialists.

We utilise these findings as the basis for assessing the effectiveness of the existing modes of collaboration identified above, mainly for the two reasons: (1) the study provides the evidence-based result linking collaborative arrangements and innovation outcomes, and (2) survey results were based on data collected from the same population sample as the cases in this study.

Results of the Assessment

As far as technological innovation domain is concerned, teamwork is an effective form of collaboration because the existing teamwork is principally embedded in the interaction between museums and universities, joint working groups involving heritage conservation department of local university for restoration at C1 are a classic example, which proves that university as an important R&D institution and technology supplier can play a vital role in facilitating the transfer and adoption of analytical and synthetic knowledge so as to support museums to innovate technologically.

Despite a common practise in all interviewed museums, outsourcing, as an enabler of technological innovation, seems not to be convincing owing to (1) it is applied in a wide range of fields within the museums, from R&D and restoration to auxiliary and ancillary works; and (2) these works are outsourced to quite diverse collaborators. Given that the majority of outsourced work in museums relates to some specific services, such as artworks restoration at C2 and C3, exhibition installation at C1 and C4, and logistics and insurance services at all museums except for C4 (because toy tin soldiers exhibition is generally small-scale and less valued by its heritage value), and in the form of contracts with museography-oriented firms (C2, C3, C4) and individual specialists (C3), such form of collaboration is sub-optimal for technological and cultural innovation. Conversely, it is more effective for museums to outsource R&D and other technology-related tasks, like high-stimulation technique adoption at C1, digitalised exhibition and museum development at C2 and C3, or ICT-based value-added service at C4, to external technology firms because they are validated facilitators of technological innovation for the museum sectors.

With regards to production-based cultural innovation, joining a consortium is a good way for museums to develop and/or adopt new cultural products, especially for

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2
3 small museums like C3, which adopted a collaborative strategy to join the Consortium
4 of Museums of Valencia Community. This is because the consortium is usually
5 institutionalised through the establishment of museum associations and alliances, which
6 constitute an important platform for knowledge-exchange and experience-sharing
7 within the professional network and community. As shown in study case, the
8 membership of museum consortium permitted C3 to share resources in artistic
9 production, exhibition programming, educational activities and investigations so as to
10 make up for a deficiency of cultural innovation capacity owing to relatively inadequate
11 symbolic knowledge bases.
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24 But the role of teamwork and outsourcing in the process of cultural innovation is
25 still unclear. On the one hand, collaborating with independent curators seems to be
26 common practice in museums today, especially in small and mid-sized museums, but
27 individual specialists do not have a significant role in fostering cultural innovation in
28 museums. On the other hand, just as shown in the cases of C1, C2, and C3, outsourcing
29 exhibition is often the objective of inter-museum collaboration, which does not
30 contribute to the development of cultural innovation capabilities in museums either.
31 This is also consistent with our empirical observation, from the early innovation survey
32 on Valencian museums, that a majority of local small museums scattered in remote
33 towns and villages are more likely to count on, or even exclusively rely on, external
34 curators for organising new exhibitions, but it, obviously, cannot be concluded that
35 those small museums are more culturally innovative than other large and medium-sized
36 counterparts.
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53 An explanation might be that the introduction of new cultural products, like
54 exhibitions, only contributes to the novelty of “programming” (Castañer and Campos
55 2002), which is essentially different from the outsourcing of R&D and the adoption of
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external technologies because the latter requires museums to identify external technologies and incorporate them into their own museographical functions to improve their technological innovation capabilities.

Lastly, it should be mentioned that Li and Ghirardi (2019) study focused exclusively on supplier-producer interaction, which precludes the assessment of collaboration based on user-producer interaction. Cultural innovation in the experience domain is mostly reliant on user-producer interaction wherein conversational collaboration is widely utilised by museums, so the assessment of collaboration for experience-based cultural innovation requires further study in the future.

Conclusion and Implications

The aim of this study is to explore the existing modes of collaboration involved in the process of production and innovation of museum organisations and further, to assess their effectiveness in facilitating both technological and cultural innovations of museums. To achieve this aim, we developed a four-domain analytical framework matching the type and process of innovation to reflect the peculiarity of museum organisations. By analysing main motives and forms of collaboration based on the multiple case study of four small and medium museums in the city of Valencia, Spain, we may conclude that there are different modes of innovation in the domain of innovation and production of museums.

Specifically, the process of technological innovation, in both, the production and experience domains, is embedded in the creation of analytical and synthetic knowledge, wherein major modes of collaboration are characterised by more formal and institutional forms (e.g., contract) involved in supplier-producer interactions, such as outsourcing and teamwork, with a view to making up for the shortage of manpower and technologies. On the other hand, the process of cultural innovation, no matter in the

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3 production or experience domain, is based on symbolic knowledge bases, wherein a
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5 dominant form of collaborative practices, i.e., conversational collaboration, is more
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7 informal between producers and users and consequently, promoting a user-focus and
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9 demand-driven innovation.
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12 However, this conclusion is solely a snapshot of museum collaboration, which
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14 doesn't reveal if these collaboration modes adopted by museums can improve
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16 innovation outcomes or not. To address this issue, we further assess the effectiveness of
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18 existing collaboration based on supplier-producer interaction. The result shows that
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20 teamwork is an effective form of collaboration for technological innovation, while
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22 consortium is beneficial for cultural innovation in the production domain; the strengths
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24 and validity of outsourcing will depend on the collaborator – outsourcing to high-tech
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26 firms, universities and research centres, rather than individual specialists or
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28 museography-oriented firms, can facilitate technological innovation.
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33 These conclusions have some implications for innovation management in
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35 museum organisations. First, it is important to favour quality over quantity of
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37 collaboration, only effective modes of collaboration can achieve museum innovation.
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39 Second, by doing so, the decision to collaborate should be guided by considerations
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41 such as what kind of innovation is to be achieved. Third, collaboration is not a shortcut
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43 to museum innovation because some innovative activities, like arts and humanities
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45 research, are mostly reliant on the museums' own capacity for innovation instead of the
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47 adoption of external innovation.
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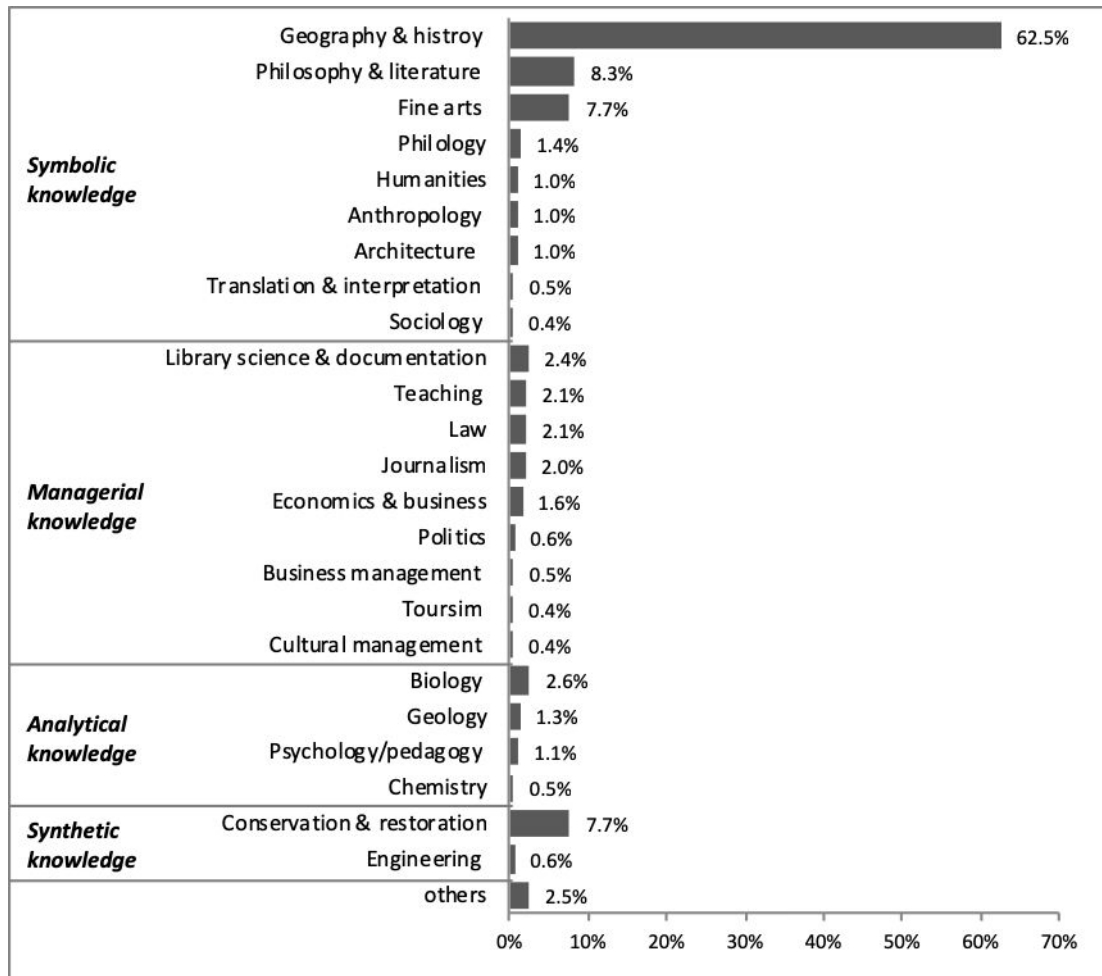


Figure 1 Knowledge bases of Spanish museums

Source: Ministerio de Educación, Cultura y Deporte 2012

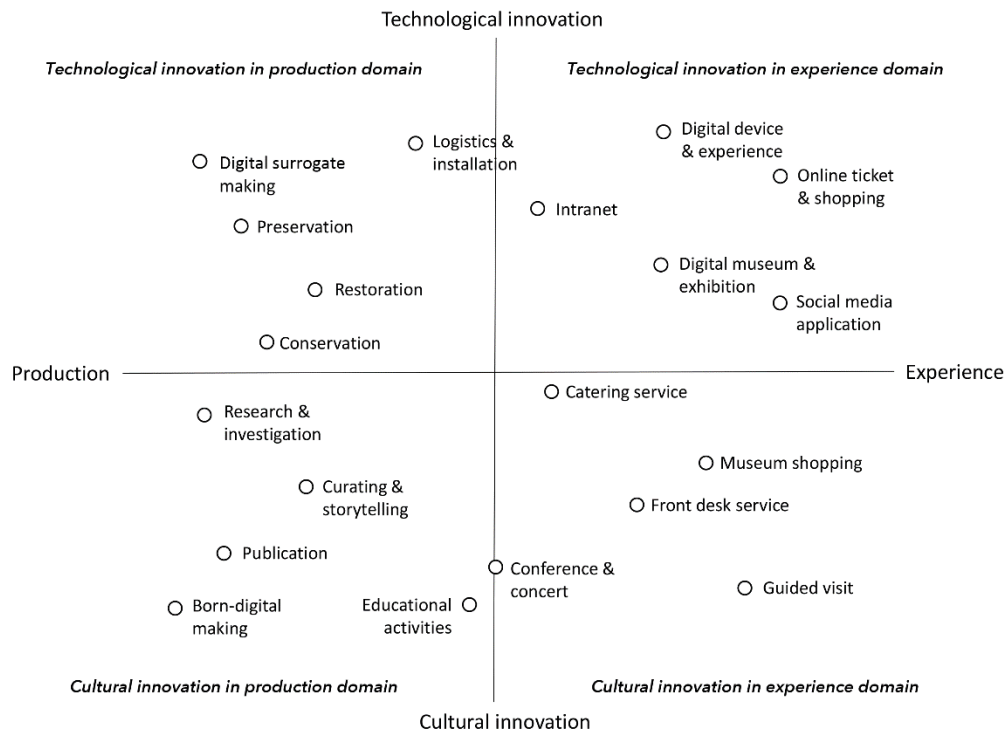


Figure 2 Four domains of the production and innovation of the museum organisation

Review Only

Table 1 The summary of interviewed museums and interviewees.

Museum				Interview		
Case	Type	Ownership	Staff no.	Interviewee	Date	Length (min.)
C1	Natural history	Municipal	2	Director	05/02/2017	42
C2	Ethnology	Municipal	24	Director	20, 21/10/2015	120
C3	Contemporary arts	Private	2	Deputy director	18/11/2015	37
C4	Specialised	Private	10	Director	13/11/2015	110

Table 2 The description of four cases

	C1	C2	C3	C4
Type	Natural science	Ethnology	Contemporary arts	Specialised collection of toy tin soldiers
Ownership	Municipal government	Municipal government	Private	Private
Size	Only 2 staff, one of whom is a contract worker from a private company. The director takes up multiple roles as registrar, conservator, and curator.	24 staff, over a half of whom are conservators & restorers in the restoration and investigation department.	Only 2 staff take responsibility for museum's daily operation.	10 staff; the collector – who is the director, curator, and restorer – plays a decisive role in the museum management.
Restoration	Rely exclusively on project-based working team involving professors and students from local universities.	Outsource a part of works to professional restoration companies because of the understaff of restorers, especially when facing a large amount of work and approaching deadline, esp. only days before the inauguration of exhibitions.	No full-time restores. It only contracts an independent restorer temporarily when objects need to be restored	Rely exclusively on internal R&D because the restoration of tin soldiers is a marginal subject totally different from that of other ordinary arts and heritage objects and there's no prior experience to learn from.
Digital	High-stimulation exhibits	The utilisation of digital	Staff only take up	The director takes up all

museum	that allow visitors to feel a real sense of exhibits through touching, developed by the company Olorama. Unavailability of museum website owing to the shortage of budget and manpower.	technology is modest, and only effort has been devoted to an interactive game in the website with the help of a local technology partners.	system maintenance and content update that don't ask for the expertise of IT. External information technology suppliers are contracted for all IT-related platform constructions, e.g., website and an on-going digital project concerning 3D-oriented virtual exhibition.	IT-related works ranging from constructing and maintaining website to making and posting contents at social media because of his in-depth knowledge and prior working experience as IT engineer, except for the collaboration with the Vodafone Foundation to equip wireless infrastructure under partnership agreement.
Exhibition	Most exhibitions are planned and interpreted by the director herself on the basis of her own interests. Some exhibitions are 'ready-made' introduced from other museums.	Collection rental and exhibits on loan are stressed to facilitate the production of new content in permanent exhibitions, as well as introducing external exhibitions to enrich exhibition programme of the museum.	The sole curator makes his own effort to develop Collection-based exhibition under different themes. The membership of the Consortium of Museums of Valencia Community helps it to engage in close collaboration with other members to share resources in artistic production, exhibition programming, educational activities and investigation.	The director works as a typical "lone scholar" immersed in books because curating a new exhibition consists of historical research about fashion, customs, social outlook, etc. in this case. But he also asks for advice and help from specialists with whom he has a longstanding friendship.
Visitor service	Regular satisfaction surveys and face-to-face communication with onsite visitors conducted by the director.	Interact directly with visitors to track their preference and needs through claims and suggestion system.	"Dynamic visits" approach is developed to strengthen visitor engagement. Visitor surveys and suggestion box are used to evaluate and improve visitor service.	Collect feedback through online and onsite interaction with visitors.

Table 3 The matrix of collaboration modes in terms of four domains of production and innovation of the museum

Domain	Production-based technological innovation	Experience-based technological innovation	Production-based cultural innovation	Experience-based cultural innovation
Functional works	Restoration	Digital museum	Exhibition	Visitor service
Collaboration motive	1. Supplement manpower 2. Making up for the scarcity of analytical/synthetic knowledge	1. Supplement manpower 2. Making up for the scarcity of analytical/synthetic knowledge	1. Improving demand-driven innovation 2. Supplement manpower	Improving demand-driven innovation
Collaboration form	1. Outsourcing 2. Teamwork 3. Conversation	1. Outsourcing 2. Teamwork	1. Conversation 2. Teamwork 3. Outsourcing 4. Consortium	1. Conversation

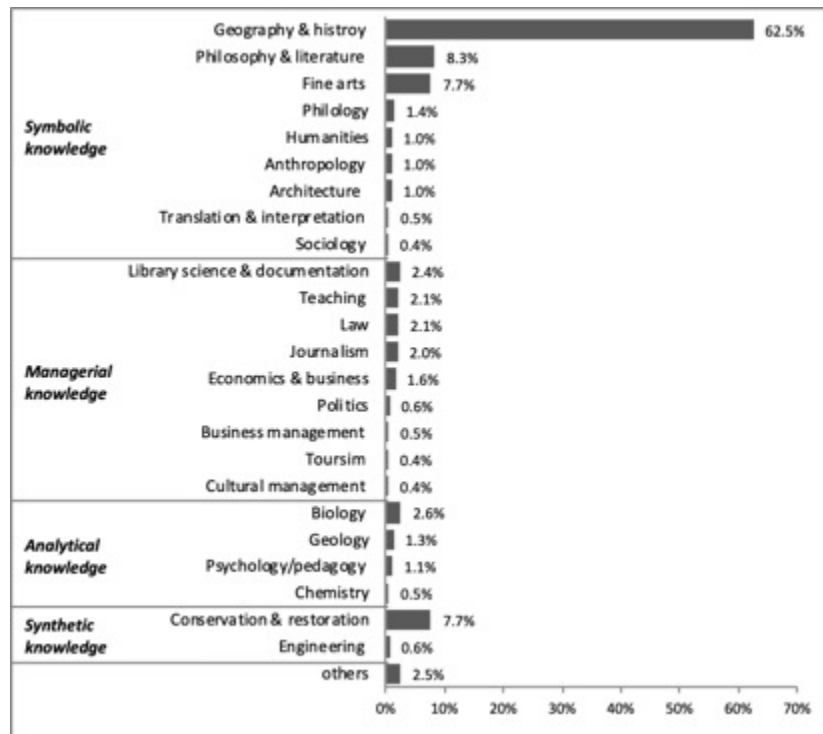


Figure 1 Knowledge bases of Spanish museums
Source: Ministerio de Educación, Cultura y Deporte 2012

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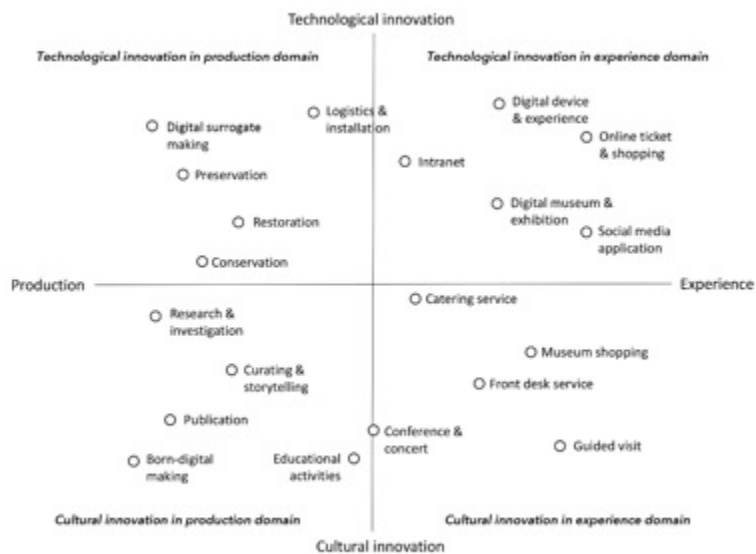


Figure 2 Four domains of the production and innovation of the museum organisation

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