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The Transformation Process of a Former Industrial Plant into an Industrial Heritage Tourist Site as Open Innovation

Mateusz Naramski , Krzysztof Herman and Adam R. Szromek

Department of Organization and Management, Institute of Economy and Informatics, Silesian University of Technology, Akademicka 2A, 44-100 Gliwice, Poland; krzysztof.herman@polsl.pl (K.H.); adam.szromek@polsl.pl (A.R.S.)

* Correspondence: mateusz.naramski@polsl.pl

Abstract: The study focused on the application of Open Innovations (OI) in industrial heritage tourist sites. The transformation of a former industrial plant into a tourist attraction is one of the most effective ways of heritage preservation. However the process of revitalization can take years or even decades, and guidelines set from experienced facilities that have already gone this path could be extremely valuable for regions aspiring to hold such sites in the future. The benefits would be mutual if the OI had an Outbound Pecuniary structure. Therefore the main goal of our study was to recognize the attitude of industrial heritage sites towards the concept of OI and sharing their experiences regarding revitalization and their business models. For this purpose, a survey was conducted on European Route of Industrial Heritage (ERIH) members. The results that were received from 70 sites show that a vast majority of the subjects are open to the idea of OI with no limitations coming from the type of ownership they have, nor from the sector a recipient of OI would be from. The benefits gained from OI to ERIH sites could have a potentially significant impact on their future development.



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1. Introduction

Almost 20 years have passed since Chesbrough [1] has introduced the idea of Open Innovation (OI), and since then its popularity and importance have been continuously growing, which finds reflection in the increasing number of scientific publications on this issue published each year since then [2,3]. Although originally the concept of OI was meant for large companies, the idea has spread also to small and medium-sized corporations and found application in various fields, not only strictly related to management [2]. The main premise of OI is that sharing already established solutions can be mutually beneficial for the sharing and receiving side—the one who shares can use ideas from other fields that have been made available by other parties, and the receiver does not have to waste resources for the development of things from scratch that has been already created by others. Therefore in OI the competitive advantage does not come from knowing things that are hidden from others but rather from making better use of commonly available ideas. OI also imply that organisations will become more and more dependent on external knowledge in order to successfully introduce an innovation [4].

The effectiveness of OI varies from organization to organization and it can be affected not only by the organization's approach to this concept but also by other factors [5]. For example, a study by Carmona-Lavado et al. [6] provides insight into how the combination of three openness practices (high number of alliances, partners diversity, external R&D) and four organizational assets (human capital, alliance coordination capabilities, inter-organizational learning capabilities, and patenting orientation) affects OI performance.

In general, open Innovations can be categorized into three main processes [7]:

- Outside-in—in this kind of process external knowledge is incorporated into the innovation processes. In other words, the experiences of partners, clients, and suppliers are used by an organization for more efficient change, and the new knowledge does not originate from within it.
- Inside-out—it is a reversed process of Outside-in open innovation, and it refers to the transfer of knowledge to entities outside the organization in which the knowledge was created.
- Coupled—where both inside-out and outside-in processes are carried out simultaneously.

Another popular classification of OI can be found in the work of Dahlander and Gann [8], and then by Suhada et al. [9], who distinguish four structures of openness that are dictated by two planes—financial and directional:

- Outbound Non-pecuniary (Revealing)—sharing internal knowledge or innovation for free or without the expectation for long-term monetary wins.
- Outbound Pecuniary (Selling)—sharing internal knowledge or innovation via a contract with the intention of making financial profits.
- Inbound Non-pecuniary (Sourcing)—using external knowledge or intellectual property that is available for free.
- Inbound Pecuniary (Acquiring)—buying access to knowledge or innovations that are not publicly available.

As Chesbrough [10] has underlined, business model innovations are hard to achieve, yet they are vitally important. The difficulty lies in the organizational processes that need to change with innovations, but those are not included in conventional tools for business model change like maps. Additionally, there is no universal set of best practices that can guarantee the efficiency of OI, but those need to be developed individually, and are different from sector to sector [11], as well as they vary based on the firm's attitudes toward external knowledge [12]. In a recent study Barbic et al. [13] notice that OI are also related to value creation and value capture, while the first one contributes to the continuation of OI, the threat of value capture might lead to a closing of OI. Another fact that has to be considered when transferring knowledge in form of OI is that there are geographical differences in the way firms from various regions behave when they enter a new submarket, as a study has shown on the example of the technology sector [14]. On the other hand during the current situation regarding the COVID-19 epidemic OI seem like a legitimate resource for accelerating the recovery process of economic systems and reducing the costs of it [15].

The idea of OI has been very popular in tourism research in various contexts—sustainability issues have been receiving more and more attention since 2003 which is reflected in the annual number of publications regarding this topic [16]. OI have also been revived from the perspective of Big Data application for reaching sustainability goals [17], as well as in the context of smart tourism [18]. Nevertheless, OI are still seen as a challenge in the tourism sector, and social media are seen as a fundamental tool for customer involvement in innovation performance [19]. Another research by Pikkemaat and Peters [20] on OI in tourism identified that one of the success factors for innovation is cooperation and communication, as well as the will to share experiences and to work in networks. Whereby the same study finds that knowledge and know-how are the base for the development of new strategies. However, the topic of making the knowledge and experiences from transforming a formal industrial plant into a heritage tourism site part of the open innovations domain, has never been brought up before. A similar issue was only raised up by Szromek [21] who discussed the transformation of business models in tourism for the Spa industry during the COVID-19 pandemic.

Therefore the goal of our research was to identify the attitudes and willingness of tourist organizations that already accomplished such transformation to share their knowledge and experiences in form of open innovations.

2. The Issue of Transformation in Industrial Tourism as Open Innovation

The second half of the 20th century brought changes for many European countries as they moved from an industrial to a post-industrial economy. The process left a large number of former industrial plants (like mines, steel mills, old production lines, etc.) with no further application [22]. Abandoned and left alone for decay those old monuments of former times would slowly vanish, and the heritage values carried by them would be irreversibly (at least not without the loss of authenticity) lost. Some of such sites found a new application (for example old mine management buildings were adopted for offices for public administration or regular housing, and other facilities were repurposed for new functions—stores, workshops, storages, etc.). However such applications focus on the new function of an old industrial facility, and most of the time their operation does not refer to the original function—so the information about the former way of working and living gets lost in the process.

Tourism has proven itself to be an effective way to save some of such industrial plants in a way that not only preserves their material structure but also the intangible values that are associated with them [23–26]. This makes industrial heritage tourism part of a wider category, which is cultural tourism [27]. A study from Korea [28] has shown that open innovations can be applied in cultural tourism with the hope for easier customer satisfaction and better brand awareness, as well as more knowledge regarding the creation and good use of opportunities and product development. The same concept can find application in the transformation process from an active or inactive production plant into a tourist attraction.

The transformation process of a former industrial plant into a tourist attraction is complex and varies from site to site, as each of them is unique in its own way [29]. However, some main categories of this type of facility can be distinguished, and therefore archetypes for transformation can be identified. In one of our previous works, we proposed a general classification that distinguishes three main types of industrial heritage tourist ventures and their subtypes [30]:

- Post-production tourist organizations—Facilities that are former industrial plants and stopped their production in the past, before it was opened for tourists and currently carries out only the touristic function.
 - Post-production tourist organizations with shifted tourism function—this a subtype of post-production tourist organizations, in which the production and tourist function overlapped in the past before the industrial facility became only a tourist attraction (without the pause between the two functions).
- Production and tourist enterprises—This type refers to historical production plants that still carry out production as their main function, but started to supplement it with touristic tours where visitors get to know the historical arts of crafting.
 - Production and tourist enterprises with dominant tourist function—a subtype of the second type of production and tourist enterprises in which the tourist function became dominant over production and stayed so till the current day.
 - Production and tourist enterprise with restarted productive function—a site in which similarly to post-production tourist organizations the productive function was ceased in the past and after some delay the touristic function took over, but in response to the visitors need a small scale production of the original good was restarted (for demonstration or merchandising purposes).
- Tourist thematic organizations—a touristic site that has in its past never been a production facility but was rather from the start meant for touristic purposes (to present industrial heritage in form of exhibitions or artifact collection in a non-industry related building).
 - The extended thematic tourism organization—just like the regular tourist thematic organizations these subtypes were constituted in a place that has no

production history, but just like production and tourist enterprises with the restarted productive function, they introduced a production function in response to the tourists' demands.

Understandably the transformation process for each of the listed industrial heritage site types is different—various subprocesses need to be completed, as well as different requirements and regulations have to be met [30]. One of the first large clusters of former industrial plants that were transformed into a touristic route was the German *Route Industriekultur* established in 1999, it was used as a raw model for the creation of ERIH and researchers suggested that it could be used by other European countries [31]. Evidence from other countries shows that indeed such an approach was applied for the revitalization of former industrial plants and the creation of other European industrial routes, especially in Spain, Belgium, France, Poland and Greece [22]. The successful imitation of the German model in other countries suggests, that a similar approach could be applied in other countries or regions, not only in Europe but on other continents as well.

The experiences and know-how that was gathered during the transformation of already functioning industrial heritage sites could be extremely valuable for owners of facilities or administrators of regions that are rich with this type of heritage and aspire to adopt the touristic function for themselves, making the transformation process much easier and faster than it was in the case of the pioneers. The openness of a transformation process would also be an answer to a frequently asked question in former industrial regions—what to do with the degrading heritage, that has lost its original function [22]. The monetary benefits from pecuniary Open Innovations for already well-developed sites received from guiding newly transforming regions or sites might be key for their future functioning and growth. This is because, as for now, a large part of the most recognizable industrial heritage sites are operated by public institutions [32], and as various sources mention—most of them struggle for funding, where the majority breaks even at the end of the year or they are fully dependent on grants and donations [33,34]. The application of Open Innovations for the transformation processes could also help avoid issues that have been identified in regions that tried to undergo such programs from scratch by themselves, such as missing leadership and strategic direction from the governmental side, poor local tourism marketing and budgeting [35,36]. Currently Open Innovation is considered to be one of the most effective ways for knowledge transfer and innovation sharing [37–42], and therefore one can recommend it for the share of transformation experiences in industrial tourism.

The main question one might ask is whenever there is still demand or need for such insight and knowledge transfer. The answer is positive, as many cases in the literature show—new regions that want or already started to transform from former industrial centers to tourist destinations that build their offers on industrial heritage can be found in various places all over the world, like: brownfields in Austria [43], iron and steel plants in Slovakia [44], oil shale mining regions in Estonia [45], coal mining industry in Newcastle (UK) [46], the automobile industry in Toledo (OH, USA) [47], diamond mines in South Africa [48], industrial and mining facilities in Cantal Urals (Russia) [49], the “Big Hole” in South Africa [35], or the industrial heritage of Mostar (Bosnia and Herzegovina) [50].

3. Materials and Methods

For the subject of our study, we selected the European Route of Industrial Heritage (ERIH) member sites, as it is the largest thematic route on the continent that associates the most valuable and recognizable monuments from the industrial past. As sites that are highlighted by such association, we assumed they possess the required experience and maturity to be able to share their opinions on the concept of sharing their knowledge on the transformation processes in form of open innovations. In 2021 when our study was designed the route had almost 2000 sites listed on their website [51]. However, 313 of them were regular members of the association (from which 110 were marked as Anchor Point—places highlighted as the most valuable of extraordinary historical importance

and highest quality of visitor experience), and the rest are smaller sites without ERIH membership.

To achieve the goal of our study we conducted an in-depth interview with representatives of ERIH sites. The majority of them are managers or representatives of managers in those facilities. Therefore, at the end of 2021, we have sent an invitation to those 313 member sites, asking them to participate in our study by filling out an online questionnaire (using Google Forms). The data collection was ended in January 2022 (with 2 reminder messages sent in this period). The number of responses we received was 73, giving us a return rate of 23.32%. However, 3 of the responses refer to a specific type of site (historic settlements), so for the purpose of the research in this paper, we used only the results from 70 surveys.

The conducted study was part of wider research, and the interview questionnaire contained 6 sections that referred to: general information about the site, open innovations attitude, business models, COVID-19 effects, the origin model of the site, and sustainable management. In this paper, we present and analyze the answers from the 2 first sections. This part of the questionnaire contained closed multiple-choice questions or assessment questions that used either a 3 or 5-grade Likert scale, which is commonly used in sociological and managerial research [52–54]. We selected these types of questions as the representatives of ERIH sites are familiar with them, and have been used in previous studies conducted on the route [55,56]. The entire research process was illustrated in form of a diagram in Figure 1.

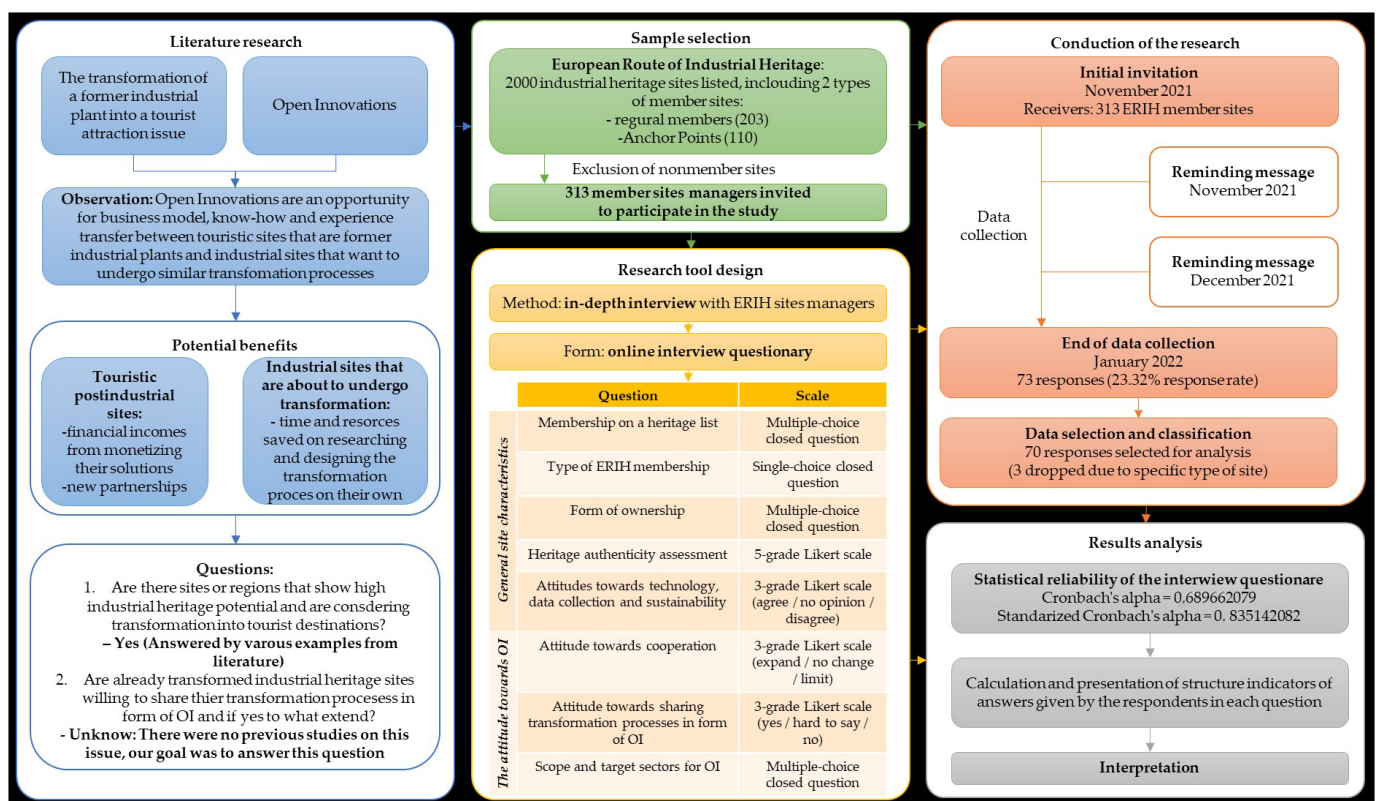


Figure 1. Diagram of the research process.

The qualitative data produced from those questions was analyzed with structure indicators.

The reliability of the research tool was assessed for the whole interview questionnaire. The analysis of the reliability of the questionnaire using the Alfa-Cronbah coefficient showed that the value of the coefficient for the verified questionnaire was 0.6897, while in the case of the standardized Alfa-Cronbah coefficient for removing missing data by

replacing it with the mean value, it was 0.8351, which allows to state that it is reliable. All calculations were performed with the statistical analysis software STATISTICA 13

4. Results and Analysis

The first part of our survey contained questions that allowed us to characterize the researched ERIH sites. It started with a question to determine how many sites are inscribed on the UNESCO or a national Tentative List, and what is their type of membership in the ERIH association (regular member or Anchor Point). The results are shown in Table 1.

Table 1. The share of research subjects inscribed on a heritage protection list and type of membership in ERIH.

Type of Heritage List	Share
UNESCO	12.86%
National Tentative List	22.86%
None	64.28%
Type Membership	Share
Anchor Point	40%
Regular member	60%

The results show that only a third (35.71%) of the ERIH sites participating in the study are inscribed on one of the two heritage protection lists, where the amount of sites on the UNESCO list (12.86%) is nearly the half size of the number of entities inscribed on a national Tentative List (22.86%). Our research sample consisted of 40% ERIH Anchor Points and 60% was made by regular members of the association. This is close to the real structure of the whole ERIH rouse (34.14% and 64.86% respectively). Predictably, the conducted analysis has shown, that Anchor Points are more likely to be on heritage protection lists (50% in total are either on the UNESCO (21.43%) or national Tentative List (28.57%)). Whereby most of the members are not inscribed onto any of those (73.81%).

Next, we asked about the form of ownership of given sites. The results reveal that as expected most of the studied facilities are public institutions (51.43%) and nearly every fifth site has a mixed (i.e., private-public) ownership form (21.43%). The results were visualized in Figure 2.

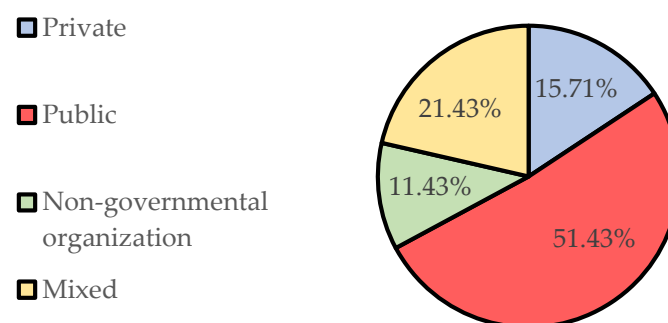


Figure 2. The structure of ownership form among ERIH sites.

As mentioned in the introduction, most public museums struggle for funds and are dependent on donations. This strengthens the argument for ERIH members to consider sharing their transformation experiences with uprising industrial heritage sites and regions, as the majority of the association member would gain benefits that could significantly help with their further development. Additionally, in the opinion of the survey respondents, a vast majority of the represented sites possess a high level of heritage authenticity, where the ability to maintain the authenticity of a historical site while meeting the demands and expectations of tourists can be seen as a valuable skill and know-how that also is worth

sharing, and is needed from the very start (when the tourist function is introduced to a former or still active industrial facility).

The assessment of heritage authenticity was done with the use of a 5-grade Likert scale, and the results were shown in Figure 3.

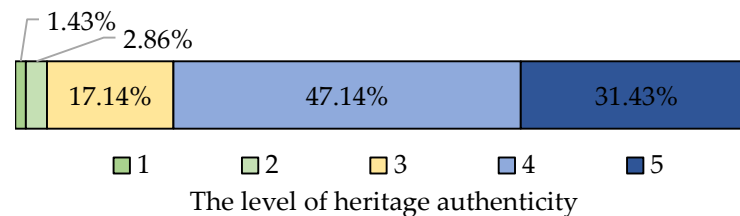


Figure 3. The assessment of ERIH sites' heritage authenticity.

Using the opportunity, we added a question with statements with which the respondents could agree, disagree or stay neutral. The statements related to observations and final conclusions that were made in our previous study [32] that focused on the use of ICTs and Smart Technologies in Polish museums. This allowed checking if some of the attitudes we observed within one European county apply also to ERIH sites. The results are shown in Figure 4.

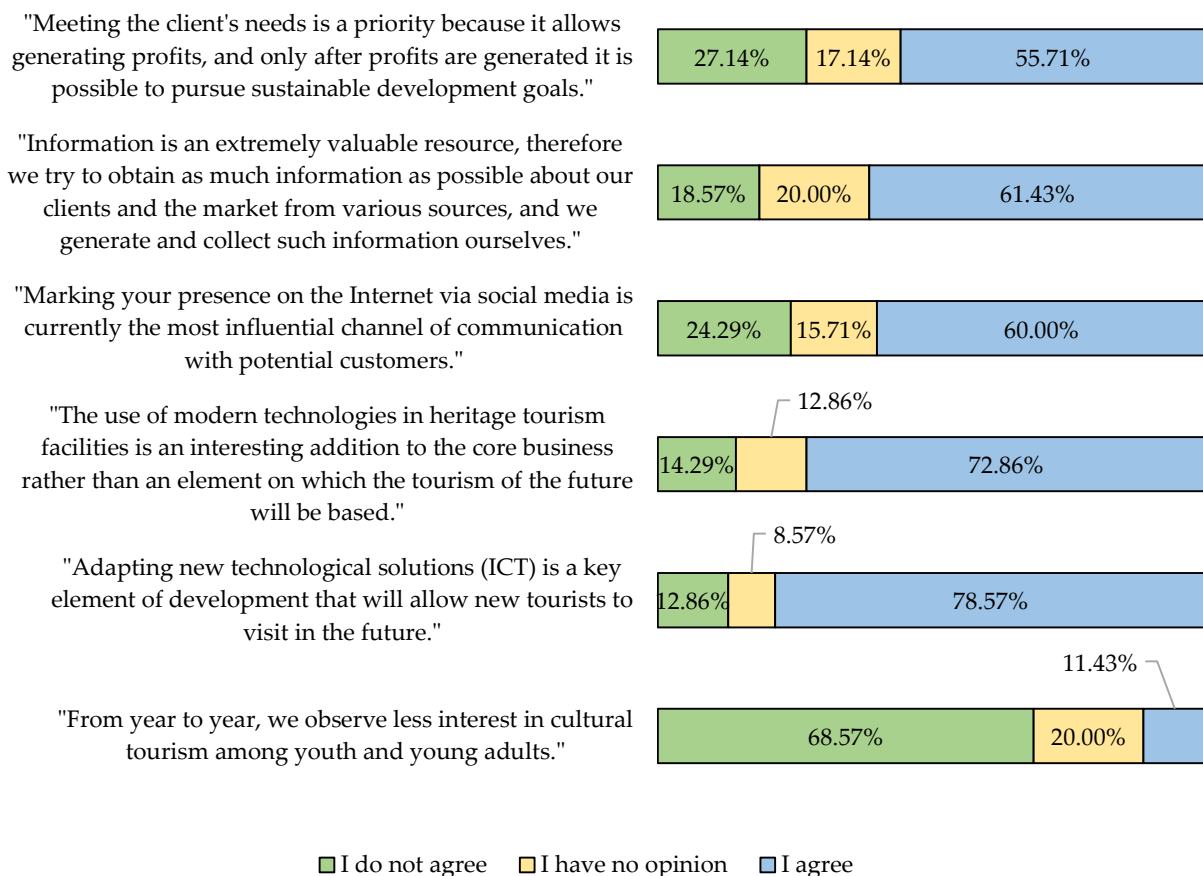


Figure 4. Selected attitudes of ERIH sites towards technology, data collection, and sustainability.

Interestingly nearly every fourth (27.14%) ERIH site representative believes that reaching sustainability goals is not fully dependent on meeting the clients' needs. This might suggest that, unlike artificially created tourist attractions, some heritage sites try to fulfill a wider mission—to protect their authenticity and meet sustainable development standards, even if the tourists' needs would be more satisfied when those values would be partially

sacrificed for a temporary increase in profit. Whereby over half (55.71%) of the subjects show a more conservative approach (where environmental and social goals can be reached after the financial incomes reach an adequate level). The ERIH members also show a better approach to data collection and use (the majority with 61.43% share acknowledge the importance of digital data in today's world) than we observed in Poland alone (where only 9–50% of data is archived or used to build databases, depending on the subject the data concerns) [32]. The same observation can be made for the use of social media for communication with clients. On ERIH 60% of its members agree that this is the most influential channel, whereby Polish museums take a more old-fashioned approach and use mainly Facebook as their additional promotion channel (Facebook is used regularly by nearly 97% of Polish museums, but other social media like Twitter, Instagram and YouTube oscillate between 16–43% [32]). The differences are even more clear in the answers shared to the question about the importance of ICTs in the development of tourist sites. On ERIH 72.57% of sites recognize those as a key element for future development, whereas in Poland 72% [32] of museums are not familiar with smart tourism. The common thing for both studies is that even though ERIH sites recognize technological solutions as important, they do not see them as the main element of future tourism and integral parts of their current business models, and rather treat them as an addition or novelty. It is a easily made assumption that ICTs and smart technologies will be of real importance in the far future, but many studies contradict that and they already play a substantial role as development drivers for tourism, society, and sustainability [57–60]. The observed differences show another potential area in which the experiences from the application and use of modern technologies in tourist sites would be beneficial in the domain of OI and could be a basis for international cooperation. And as the last position in this question shows, most (68.57%) of the industrial heritage sites see themselves operating in the future and do not observe a decrease of interest among youth and young adults who are more technology-oriented than older generations.

Next, the survey contained a question about the scope of cooperation of industrial heritage sites with each other—should it be made broader, limited, or if the current scope is adequate. The question is differentiated between the national and international levels of cooperation, and the chart presenting the results can be seen in Figure 5.

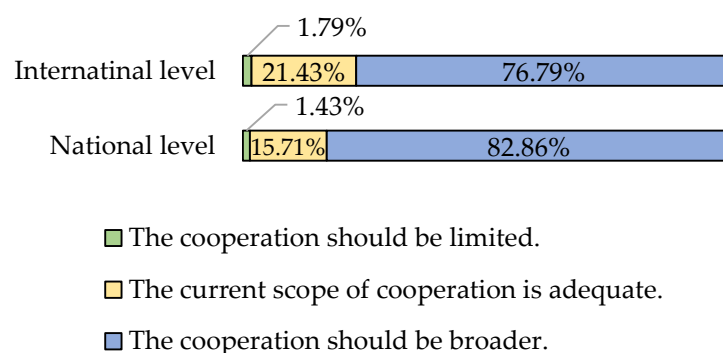


Figure 5. The attitude of ERIH sites to cooperation on the national and international level.

The results clearly show that a vast majority of ERIH sites representatives believe that there is a need for widening the scope of cooperation of industrial heritage sites both on national (82.86%) and international (76.79%). Only every fifth (21.43%) facility claims that the current scope of international cooperation is adequate and every sixth (15.71%) site does so at the national level. The votes for limiting cooperation were marginally low. This again strengthens the argument, that OI are a concept that could be applied with success to the transformation of industrial heritage for touristic purpose processes.

The succeeding question was direct about the attitude of ERIH sites towards making the transformation of former industrial facilities into tourist sites and their business models OI. Interestingly, none of the respondents gave a negative answer. The share of answers

in favor of the OI concept was 71.43%, making it the major opinion in this matter. The remaining 28.57% of survey participants selected the answer “Hard to say”. Figure 6 illustrates the described shares, including differentiation between forms of ownership.

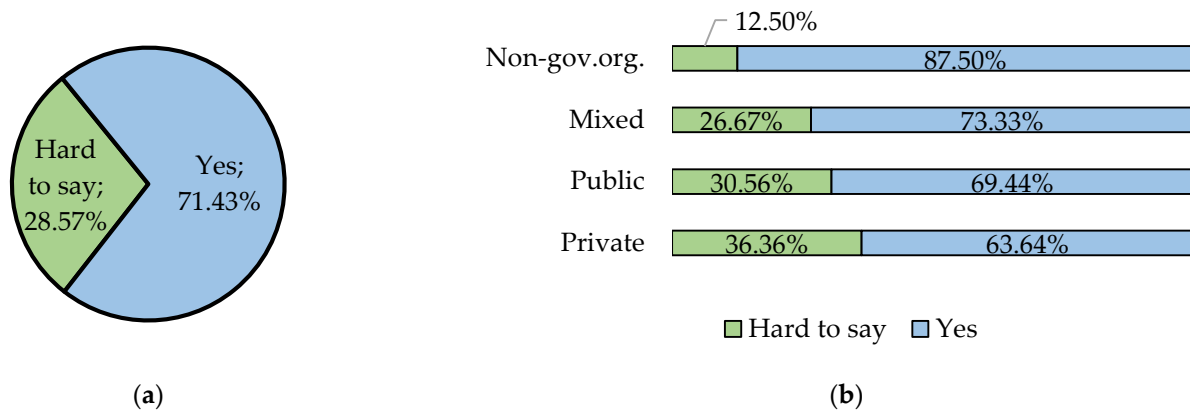


Figure 6. The opinion in ERIH sites whenever the transformation of an industrial plant to a tourist attraction process should be shared as OI in general (a) and with differentiation among various ownership forms (b).

As one can see in panel b of Figure 5, there were some differences in answers between facilities with various forms of ownership. The most decided for OI facilities were non-governmental organizations (87.5%) and the private sector has shown the least support (63.64%). It's understandable that the largest share of undecided sites was among private facilities (36.36%), as all the development of their business models and the transformation processes were developed and financed by private entrepreneurs, who would depend on their decision based on a calculation on whenever the benefits from OI would outweigh the initial costs they spend for the transformation and the higher number of potential competitors.

The concluding question to the analyzed in this study portion of our survey was about the target sector with which ERIH sites would willingly share their knowledge and experiences in form of OI. It was only available to entities that gave a positive answer in the previous question. The options that could be selected included the following statements:

- Only investors within local government units to maintain state control over post-industrial heritage;
- Only investors within private sector units to increase the expansion of the tourism market;
- Only within associations or organized routes of post-industrial tourism, for maintaining service standards and increasing the efficiency of the revitalization of facilities
- All investors (state and private) for the development of cultural heritage.

The share of selected answers in general and with differentiation for various forms of ownership were shown in Figure 7.

As one can see in panel a of Figure 4 in the opinion of the vast majority (82%) of ERIH sites the OI about transformation and business models of heritage sites should be available to all investors. The second-highest share (12%) had the option that OI on this topic should be shared only inside of associations or organized routes like ERIH, and the main scope should include increasing the standard of services for tourists as well as increasing the efficiency of the revitalization of new members. This secondary opinion was most common among sites with mixed ownership forms (27.27%). Surprisingly, the option for sharing given OI only with public investors from local government (indicated by 4% of sites in general) was not selected by any public facility, but only by non-governmental organizations (14.29% of them). Similarly, the least popular opinion (2%) that OI should be accessible only for private entities for tourism market expansion was not selected by

private owners of ERIH sites, who unanimously selected the option for availability for everyone.

Since none of the respondents answered definitely no to the idea of sharing their transformation processes and business models the question for reasons for that was skipped.

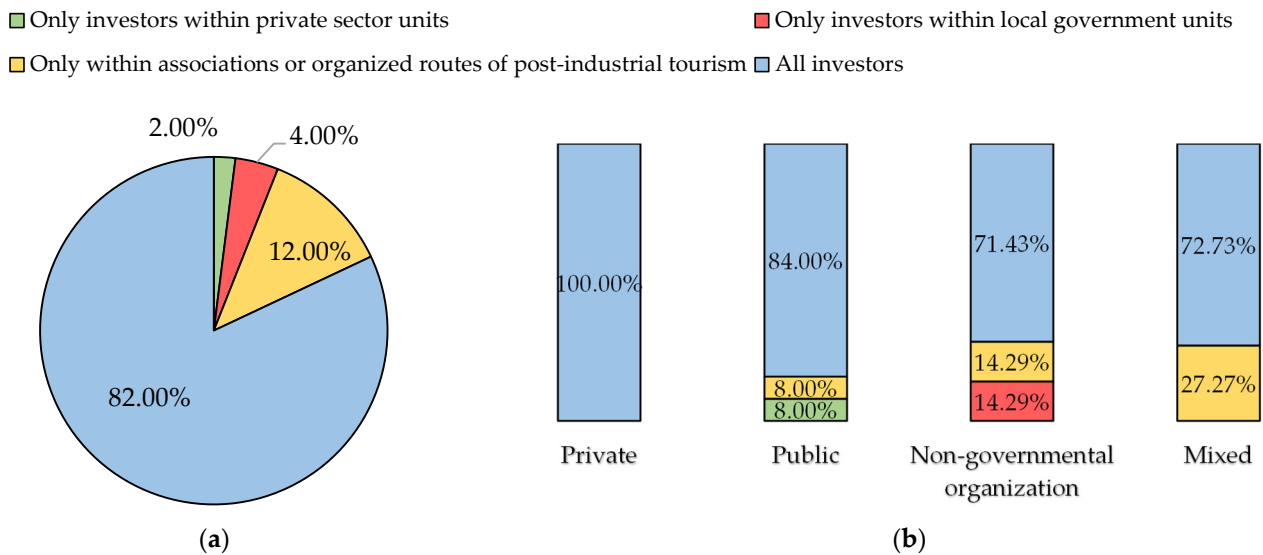


Figure 7. The scope and target organizations ERIH sites want to share their business models and revitalization processes in form of OI in general (a) and with differentiation among various ownership forms (b).

5. Discussion and Concluding Remarks

The presented study showed that there is a high potential for applying OI in industrial heritage tourist sites. We conclude that from the high share of sites that are willing to share their knowledge in form OI, as well as from the high percentage of respondents who claim that ERIH sites should expand their national and international cooperation. Those findings are in line with the observations from a previous study, in which willingness to participate in cooperation and readiness to share knowledge are identified as key indicators for innovation [20].

The OI processes, in the case of ERIH sites, would probably be most of the inside-out type for developed facilities, and outside-in for industrial facilities that want to transform into new heritage sites. As the results of our survey showed the majority of ERIH sites share the opinion that the revitalization process they have gone through and the business models they adopted as a result of this process should be part of the OI domain, and be available for any type of partnership (to investors from any sector). As underlined in the theoretical chapter of this paper, such an approach can potentially offer benefits to both sides if the transformation processes would be made available as Outbound Pecuniary OI [8,9], making them a realistic basis for practical solutions and business contracts. Through that, public institutions (that run most of the industrial heritage sites, and that are financially dependent on donations and grants) could diversify and increase their incomes, which could be decisive on their survival especially after the hard times the COVID-19 Pandemic has brought on them in the last 2 years [61]. On the other hand, newly forming regions would save time and afford to build their business models and develop the revitalization processes from scratch. This would also help to avoid commonly appearing issues that appear in cases where the heritage revitalization process is not based on already established and proven solutions [35,36]. Even though the transformation process is unique to some extent from facility to facility, we have shown that there are some major archetypes of industrial sites, that share common features, thus making the use of experiences from similar sites compatible within the same kind of sites.

Another thing that needs underlining is the observation we made, that there are still areas all over the world with valuable heritage, that reveal a high potential to become tourist sites [43–50]. Making OI from the revitalization process a valuable issue that has potential demand. It would also be beneficial from the sustainable development point of view—as our study has shown ERIH facilities are tourist sites characterized with a high level of authenticity, and they act as safe-keepers of it. The fact that the studied subjects managed to keep this aspect high, and preserve the heritage that would be lost without touristic function, without commodification of it (at the price of authenticity for increasing attractiveness among wider audiences) is a value worth passing further on and to be an example for others.

A secondary issue that was also identified to be on a well-developed level in ERIH facilities is their use of ICTs, modern technologies, and data handling. As mentioned in the analysis section, this is not the case for many tourist sites as one of our previous study has shown [32]. Making this also a potential domain that could be shared in form of inside-out OI. Having in mind the research by Iglesias-Sánchez and Correia [19] the high-level modern technology application, especially social media, are for ERIH sites advantageous when it comes to implementing innovative management models, in a sector in which OI are still challenging. It is worth noting on this occasion, that even though the use of ICTs is seen as the future of tourism, most of the ERIH sites fail to recognize that this future is shaping right now, and their approach resembles more of treating ICTs and new technologies as a novelty than actual core for current business. Here it would be beneficial to use the outside-in OIs for refining the core of business operation and making it more new technology-oriented.

The main limitation of our study is that there are previous studies that would have tackled the specific issue of applying Open Innovations to the transformation or revitalization processes of former industrial plants into a tourist attractions. Therefore our contribution was the creation of a foundation for future studies, as we identified that there is a demand on the receiving side of OI, as well as that the side possessing transformation knowledge and experience is willing to share it in form of OI, which is considered nowadays one of the most effective approaches to knowledge transfer [37–42]. Therefore future studies could focus on developing specific frameworks and OI platforms for knowledge transfer among heritage sites, as well as on designing the processes necessary for such cooperation to take place. After that is achieved next studies could focus on optimization in this domain.

From the practical perspective, our observation that OI have a high potential in Industrial Tourism contributes to the commonly discussed and raised issues:

- How to enable industrial heritage sites that are limited by public funds to peruse sustainability goals?—The suggested by our study answer would be: by monetizing the revitalization process and guidance programs for emerging postindustrial destinations in the form of OI could secure additional means that can be used for this purpose.
- How to find a new application for old unused industrial plants and how to conduct the change without experiencing the same problems that have been observed in previous cases?—The emerging answer would be to use the offered by already experienced destinations solutions, that would be available if the form of OI.

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