

Service providers' requirements for eID solutions: Empirical evidence from the leisure sector

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Abstract: Although eID technology has undergone several development cycles and eID have been issued to citizens of various European countries, it is still not as broadly used as originally expected. One reason is the absence of compelling use cases besides eGovernment. Current Research focuses mainly on the needs of the user and technical aspects. The economic perspective is often disregarded. This is especially the case for the service providers that play a fundamental role in the adoption of the technology. The requirements of these stakeholders certainly have to be considered in the development of viable business models. So far, however, little empirical evidence on these requirements exists. We therefore performed a survey-based empirical analysis in two industries from the leisure sector to gain first insights into this topic. Results show that the service providers in our sample don't see a pressing need to change their currently used authentication method. However, they think that certain eID features could be valuable for their services. Our analysis of the hurdles showed that there is no ultimate reason that keeps service providers from implementing the eID technology.

1 Introduction

eID (Electronic Identity) infrastructures have been implemented with various strategies and expectations in many European Union Member States. In some cases, Governments have issued eID cards on a large scale basis to their population [Eu12]. However, the actual usage lacks behind the original expectations and eIDs are still not used on an everyday basis [RZ12]. One of the reasons for this is the lack of real-world use cases and applications that are perceived as beneficial by users [Ro09]. Currently, most research efforts are focused on the technical aspects of the technology [St13] However, creating a technology that is only shaped by the technical aspect will not bring long term success. It is necessary to create a well-rounded product including the economical and societal aspects as well [ZR12]. In [ZiRo12] an economic analysis has illustrated how the relationships between users and relying parties are significantly influenced by indirect network effects. In detail, the indirect network effects lead to a common problem found in multi-sided markets, “the chicken or egg” problem [CJ03]. When there is a lack of a user adoption or a user base, the motivation for service providers to assist or implement a new product or service is insignificant. On the other side [ZR08] argue that “for a user to gain meaningful reduced sign-on capabilities across the web, a system has to be widely adopted, and its underlying protocol implemented by a wide range of service

providers". Therefore, the existence of promising services is an essential requirement for the success of eIDs. This requires co-operation by the service providers, which have to perceive a benefit in adopting eID technology. One of our main motives in this paper is to derive an empirical investigation in order to grasp a better understanding of the motives and needs and to identify potential roadblocks for the service providers. Our results will only show first insights of these perspectives, as our results will only reflect two industries in the leisure sector. As this side of the two sided market has been mostly disregarded, we think that this examination can nevertheless serve as a starting point for further work. The article is organized as follows. Section 2 outlines the economic perspective on the eID technology in greater detail. In section 3 we describe our empirical analysis before presenting the survey results. We conclude in section 4.

2 An economic perspective on the eID technology

In this paper we take an economic perspective on eIDs and look at the service providers as important stakeholders for the success of the eID technology. Therefore it is important to look at the structure of the market first. The challenge eID solutions are facing is that the market is multi-sided. According to [Ev03] and [Ha07], "A market is said to be two-sided if firms serve two distinct types of customers, who depend on each other in some important way, and whose joint participation makes platforms more valuable to each. In other words, there are indirect network externalities between the two different customer groups." There are three major actors in the market for eIDs: the end-user, the service provider or relying party and the Identity Provider. We now see a multi sided market, where the success of the Identity Provider depends on the amount of users of relying parties. Furthermore, the relying parties themselves benefit, if the Identity Provider has a large installed user base. In addition, the attractiveness of the Identity Provider increases with the amount of available services that are perceived as beneficial by the users. This can result in a positive feedback and thus an exponential growth once a critical mass has been reached. However, all this can also happen the other way around, resulting in a negative feedback [ZiRo12] [MR99]. When no services are supporting eID, the usefulness for the user is presumably low. And when no users have adopted the product yet, service providers' motivation to implement it is quite minimal. Empirical analysis for the Alexa Top 300 websites seems to support this model for the relationship between relying parties and Identity Providers [LM12]. In order to utilize the full potential of eIDs, the technology needs to be adopted on a wide basis. As it is a multi-sided market, this will only be achieved if all participating parties perceive a benefit in adopting the technology. For the user-side, [RZHM14] have shown in their experimental analysis that there is indeed a willingness to pay for Identity Management Solutions. They find, however, that the acceptable price varies heavily from 3 to 48 Euros per year depending on the individual's psychographic and demographical aspects. The price aside, the authors also examine the importance of several other issues that are of potential importance to the users. Interestingly, they conclude that sophisticated privacy and security features are not valued by prospective users as much as suggested by previous research. As they focus on the user-side the perspective of the service providers is largely neglected. Our argumentation illustrates the significance of the service providers being just as important as the other stakeholders in the market for eID technology. Thus,

it seems to be reasonable to shed light on the motives and needs of the service providers in regard to the success of this technology – especially as there is so far a lack of research in this area.

3 Empirical analysis

3.1 Study design

We chose the method of a short quantitative survey to gain insight into a so far relatively unstudied field. Additionally, to integrate qualitative and quantitative methods as recommended by Gable [Ga94] for Information Systems Research, we are conducting qualitative semi-structured interviews with stakeholders in the research area to gain a deeper understanding. As the qualitative part of the research project isn't yet completed, we present only the quantitative results at this point.

Our target populations are the adult entertainment industry and the tourism industry. There are several reasons why we chose these two industries. The adult entertainment industry is quite heterogenic, consisting of numerous small and medium size enterprises as well as a few larger companies. As the vast majority of the companies are privately held, no reliable data on the exact value of the adult entertainment exists. Nevertheless, various sources speak of a quite substantial market, generating several billion dollars in revenue in the United States alone (the only market for which such figures can be found) [Do08] [Da13]. In Western Europe, the online market for adult content generated 540 million euros of revenue in 2009 [Bu09]. Moreover, users of adult content have proven to be very open to innovations in the past. Adult entertainment companies have pioneered innovations in the online and offline world such as VCRs, DVDs, or the internet itself. It has also been stated that the market demand for adult entertainment products is the main driver behind the success or failure of new technologies [Da13], [An07] . In the past, consumers of adult content have shown a high willingness to pay as well [AKTC06] [Co98]. For the study of the eID technology especially relevant is the specific aspect that users of adult content are very sensitive in terms of their privacy [CD01], making it a promising field for privacy enhancing credentials [HZPD09]. Thus, the inclusion of this industry into the target population of the survey can be justified. The second industry in the sample is the tourism industry. In various countries all over the world this is the leading industry sector. It is dominated by small and medium sized enterprises [WR04]. The tourism industry constitutes a natural use case for cross border identification and authentication services. This is because in many cases the transactions involve the demand for services outside the borders of the home country of the person requesting the service. Moreover, electronic, mobile and especially personalized location-based services have been becoming more and more popular in the tourism industry over the last years and provide the basis for a range of novel applications and business opportunities to service providers [RZ12]. Existing work has shown how information intermediaries are a suitable infrastructure component for offering services to an installed base of travelers, when they provide information from various sources in a concise manner. The availability of attractive services that are compliant with privacy

settings is according to this argumentation one factor that determines customer satisfaction [Bu98]. Examples could be mobile hotel reservation services provided by local authorities to promote the local tourism sector or other location-based services provided. For these services some form of reliable authentication or identification is necessary [RZ12] [SMR09] As this can be made possible with the eID technology, the tourism industry is a quite suitable sector for this survey. To maximize the response rate and reduce nonresponse bias, the short survey was designed according to various recommendations that can be found in the literature on surveys in the corporate context [Di07] [HH04] [RL98]. Potential respondents were found on two International trade fairs in late 2012 and early 2013 and in online databases. Questionnaires were distributed on the fairs as paper versions and as a link to a digital version via e-mail. Follow-up e-mails were used to raise the response rate. Through this approach we received a total of 56 usable questionnaires. The data were analyzed using SPSS. The profile of the respondents included in our survey is shown in Figure 1 to Figure 3. The vast majority of the companies' headquarters of the respondents is located in Europe. More than half of them (55 percent) are located in Germany. About two thirds of the companies offer their services internationally (45 percent globally, 25 percent all over Europe). About one third is focused only on the German market. This makes clear that it can be assured that the eID technology is available for most (if not all) of the companies in the sample, as Germany and other European countries have already issued eIDs to their population [Eu12].

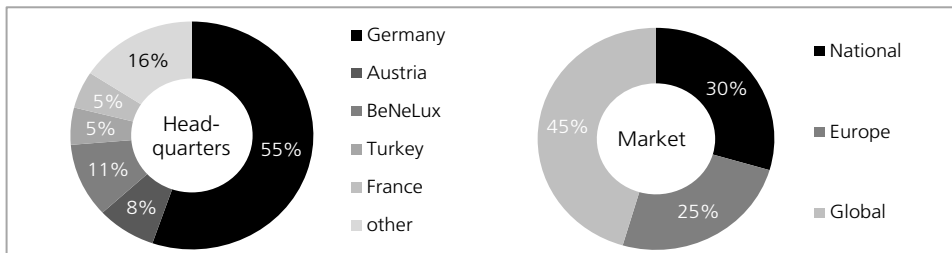


Figure 1: Country statistic of sample companies

Figure 2 shows the size characteristics of the sample companies. Our data reflects what has been written before about the structure of both industries. Very small and small companies constitute the largest groups in our sample.

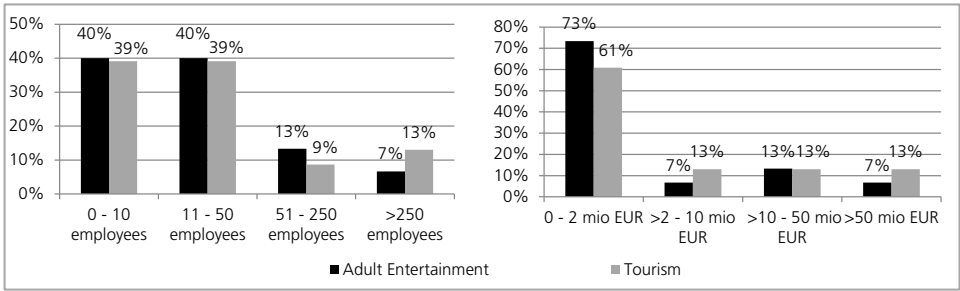


Figure 2: Size statistics of the sample companies

While 42 percent of the companies employ less than 10 employees and about two thirds of the companies achieve just 0 to 2 million Euros in turnover, only 10 percent of the companies have more than 250 employees and 12 percent of the companies achieve more than 50 million Euros in turnover. The distribution into the focus sectors “Tourism” and “Adult Entertainment” are quite balanced. This will later allow us to compare the results from both sectors. The hierarchical position of the respondents permits us to see them as key informants with sufficient expertise and insight into the topics in question. The key informant approach is a well-established method for conducting survey-research [HKRS12]. We can conclude that for a preliminary study the sample is relatively balanced and suitable to give us first insights into a relatively unexplored topic.

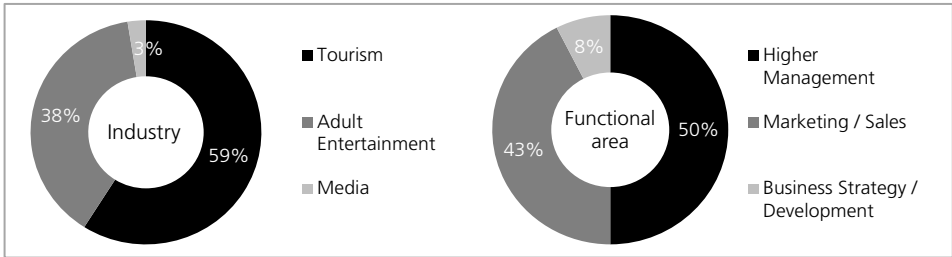


Figure 3: Industries and functional areas represented

3.2 Study results

In the following, respondents’ profiles in terms of the frequencies in which they encounter user errors and the types of errors are discussed first. Then, results on the authentication methods used are presented. Afterwards, we compare the requirements for eID solutions and the hurdles to their implementation. Finally we show the costs they expect to arise from the transition to eID technology. To get a first impression of the empirical evidence for the research field, data was analyzed using frequency statistics and for the Likert-type scale items using analysis of means. Moreover, the results of the two focus sectors were compared. We show where this revealed substantial differences.

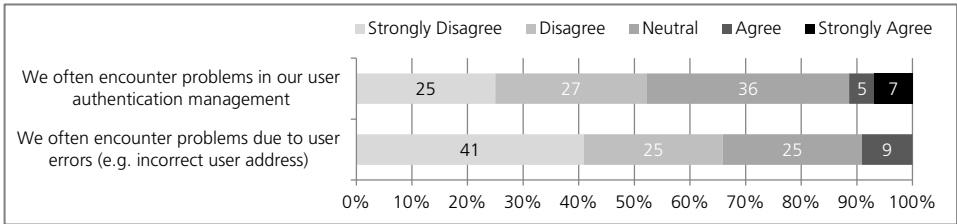


Figure 4: Frequency of (user generated) errors in user authentication management¹

Problems in user authentication management don't seem to be a major difficulty for the respondents (Figure 4). Only about 12 percent agree or strongly agree to the general statement „We often encounter problems in our user authentication management“. Focusing more on user generated errors, e.g. incorrect user address, only about nine percent of the respondents agree to the given statement. Judging from these results, it appears that user authentication management doesn't seem to be a major issue in our sample industries.

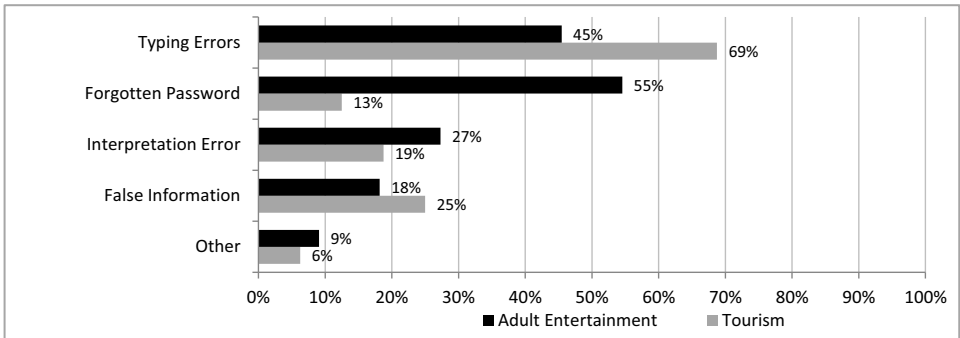


Figure 5: Different types of problems encountered due to user errors

Looking at the different types of user errors we notice certain differences between the sample industries (Figure 5). All in all, typing errors seem to be the most important cause of error, especially for the tourism industry where almost two thirds of the cases report this problem. However, for the adult entertainment industry this problem is a major problem as well, with almost half of the cases reporting it. The second biggest cause of error is password loss. Here we can recognize an even larger contrast between the two industries, more than half of the respondents from the adult entertainment industry report this problem, whereas only 13 percent of the respondents from the tourism industry do so. The next two types of problems are interpretation error and false information, both of which are reported from about one quarter to about one fifth of the respondents. Therefore, they seem to be of some relevance, but not of major relevance in this context. The striking differences between the two sectors with the first two types of errors can be explained through the consideration of the authentication methods that are

¹ In order to facilitate the readability and as the results don't vary significantly, Figure 4 shows the numbers for both industries combined.

used for the services provided (Figure 6). Here we see that passwords are only rarely used in the tourism industry (14 percent of the cases) whereas most services can be used without any necessary authentication (91 percent of the cases). In the adult entertainment industry, however, we find the opposite situation. The authentication with username and password are possible or even required for about two thirds of the services, while only about a quarter can be used without any authentication. It comes as no surprise that for firms that don't require the authentication with username and password, lost passwords don't pose a major problem. Therefore, as this authentication method is more widely used in the adult entertainment industry as compared to the tourism industry, the former industry sees lost passwords as a bigger problem. Login with Facebook is somehow common in the tourism industry, with little more than one quarter of the services in the sample offering this method. However, it is not surprising that no respondent from the adult entertainment industry offers this method for his service, as customers might be hesitant to connect an adult entertainment website with the social network of their friends and family. One fifth of the adult entertainment services offer the possibility to authenticate with a national eID card, whereas in the tourism sample this method is non-existent. Here we might see that the adult entertainment industry is indeed very open to new technologies (see above). The same might apply to the methods Google ID / Open ID that are supported by 13 percent of the services from the adult entertainment industry in the sample.

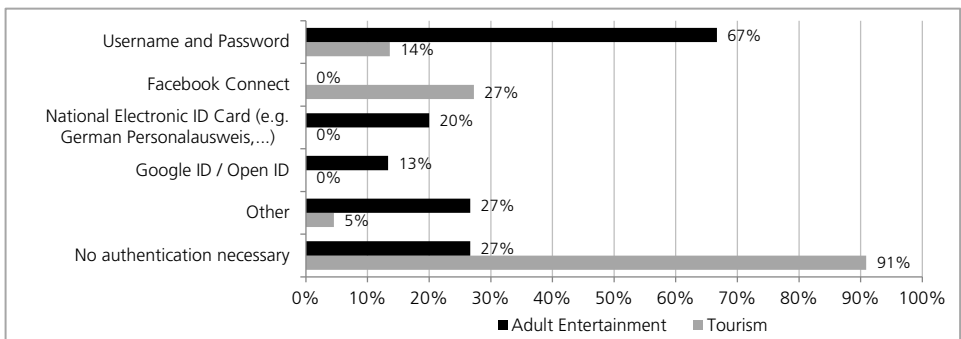


Figure 6: Authentication methods for services provided

The results above show that eID solutions are not supported by a substantial number of services in the sample (only 20 percent in the Adult entertainment Industry which corresponds to 6 percent of the valid total cases). Moreover, the service providers in our survey do not report to have lots of problems with their currently offered authentication methods. Therefore, to contribute to a broader success of eIDs, it could be valuable to assess what eID-features they would see as beneficial in order to develop these features further and promote eIDs by highlighting these aspects. Results from the part of the survey, that assessed the importance of certain eID features for the service providers' services, again show some differences between the two industries in the sample (Figure 7). Unsurprisingly, having a certified age verification is of very high importance (average score of 6.4) for the respondents from the adult entertainment industry. Here the eID technology could be of great value. For the tourism industry, this feature doesn't have that much relevance (average score of 4.9), but still seems to be desirable.

Respondents from both industries regard the possibility to certify the user address as quite important (average scores of 6.1 and 5.8). The certification of user age and user address appear to be the most important features for the respondents. Next, we asked for the importance of the feature that allows offering services to the user anonymously. This doesn't seem to be as important for the respondents, somehow more to the adult entertainment industry (average score of 4.9 as compared to the tourism industry (4.3). One could have expected that this feature would be of higher relevance in the adult entertainment industry. The feature that allows obtaining certified information about users' attributes is only of medium importance to the respondents of both industry sectors (average scores of 4.5). Of greater importance is the possibility to achieve higher transaction security, which can be achieved with eIDs. This feature is even a bit more important to the respondents from the tourism industry (average score of 5.6) than to those from the adult entertainment industry (average score of 5.1).

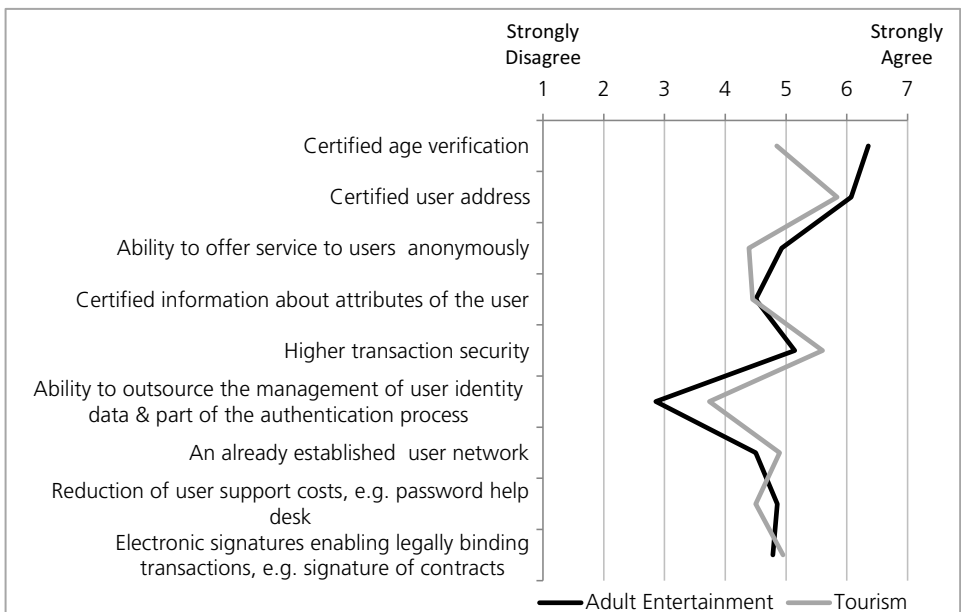


Figure 7: Importance of eID features for service providers' services

The outsourcing potential that is provided through eID solutions is the feature with the lowest importance by the respondents. For the adult entertainment industry (average score of 2.9) even less than for the tourism industry (average score of 3.7). More important, but still not of great importance, seems to be the possibility to approach an already established user network. For this feature, as for the next two, no substantial differences between the two industries can be found (adult entertainment industry 4.5, tourism industry 4.9). About the same importance scores achieves the possibility to reduce user support costs (adult entertainment industry 4.9, tourism industry 4.5). Finally, as the last feature the ability to enable legally binding transaction was assessed. Although one could expect this feature to be of high importance for the respondents, it achieves only fairly mediocre scores (adult entertainment industry 4.8, tourism industry

5.0). The last paragraphs made clear that the respondents indeed think that eIDs can provide some useful features for their services. At the same time, the diffusion of the eID technology remains low. Therefore, it seems to be reasonable to look at the hurdles to the implementation of eID technology (Figure 8). This shows even greater differences between the two focus sectors than when looking at the features. The respondents from the tourism industry score the hurdles higher than the respondents from the adult entertainment industry. At first we asked for the familiarity with eIDs. On average, respondents from both industries claim to have a medium knowledge. The level of unfamiliarity with the technology in the adult entertainment industry (average score of 3.6) is, however, substantially lower than in the tourism industry (average score of 4.7). Maybe this can be connected to the next finding that shows that the tourism industry perceives no need to change its authentication services (average score of 5.6), whereas this score is considerably lower for the adult entertainment industry (average score of 4.7).

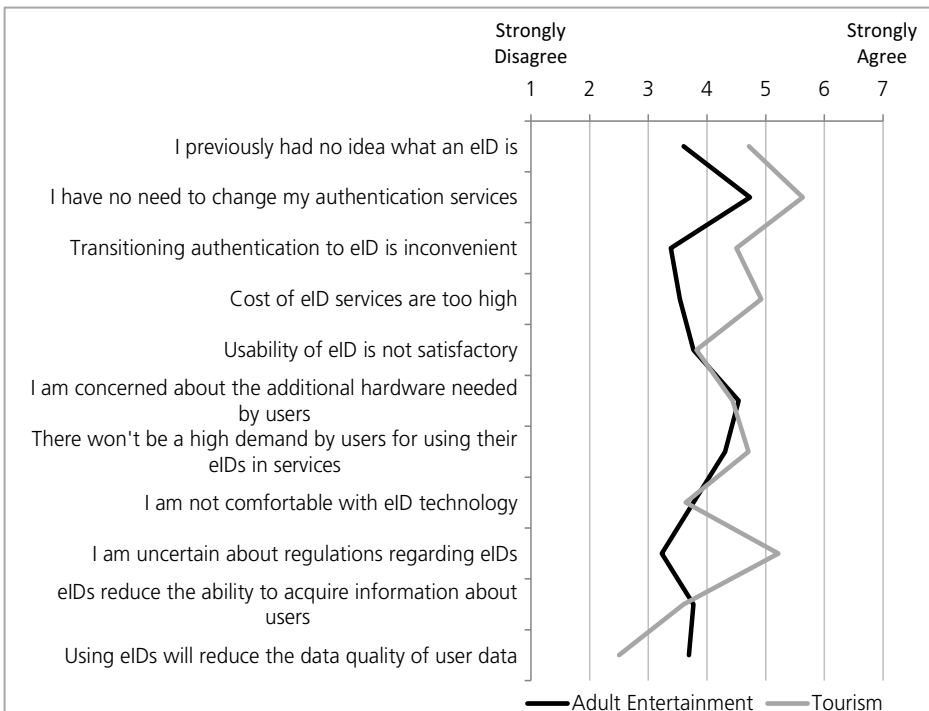


Figure 8: Hurdles to the implementation of eID technology

The adult entertainment industry might be more open to innovations (see above), be better informed about the valuable features of eIDs (see study results above), or due to its specific need for age verification be unsatisfied with the currently applied authentication methods. Nevertheless, it has to be noted, that the overall need to change the authentication service is only mediocre to low. Looking at the expectation that the respondents have concerning the inconvenience of the transition to eIDs we see as well

that this hurdle is scored substantially higher in the tourism (average score of 4.5) compared to the adult entertainment industry (average score of 3.4). High costs are also seen as a bigger problem in the tourism industry (average score of 4.9) compared to the adult entertainment industry (average score of 3.5). In terms of the usability, both industries have the same impression of eIDs (average score of 3.8). Thus, a lack of usability doesn't seem to be an essential problem for neither of the industries in the sample. Compared to that, the additional hardware that is needed by the users is seen as a somewhat higher hurdle. However, with scores of 4.4 (tourism) and 4.5 (adult entertainment industry) this shouldn't be decisive. Next, we wanted to see whether the service providers expect the users to demand the support of eIDs. The respondents of the tourism industry are a bit more skeptical towards the user demand than the respondents from the adult entertainment industry. The average score for the item that says that there won't be a high demand is 4.7 for the tourism and 4.3 for the adult entertainment industry. This shows that the end users are not seen as a major driver for the diffusion of the eID technology. Another interesting aspect could be, if the respondents feel not comfortable with the eID technology. The results show, however, that this isn't a substantial hurdle for the average respondent from both industries (3.8 for the tourism and 3.6 for the adult entertainment industry). However, in total 20 percent of the respondents partially or strongly agree to the statement that they are not comfortable with the technology. So partly, for some respondents, the negative attitude towards eIDs could play a role. Especially for the respondents from the tourism industry an uncertainty about regulations regarding eIDs seems to be a problem for the adoption of this technology (average score of 5.2). Interestingly this aspect is of much less importance for the respondents from the adult entertainment industry (average score of 3.2). The fear of a reduced ability to acquire information about users isn't a major issue for the respondents (3.8 for the adult entertainment industry and 3.6 for the tourism industry). Respondents also don't fear a reduction of the quality of user data respondents (3.7 for the adult entertainment industry and 2.5 for the tourism industry). Finally, we asked for the expected costs for the transition to eIDs. Here we could not find any substantial differences between the two industries. The vast majority of the respondents (about 61 percent) did not have any idea of the costs. The second largest group (about 16 percent), however, expected costs of about 3.000 – 10.000 EUR. Judging from our experience with past projects, we would say that this is price range is relatively realistic.

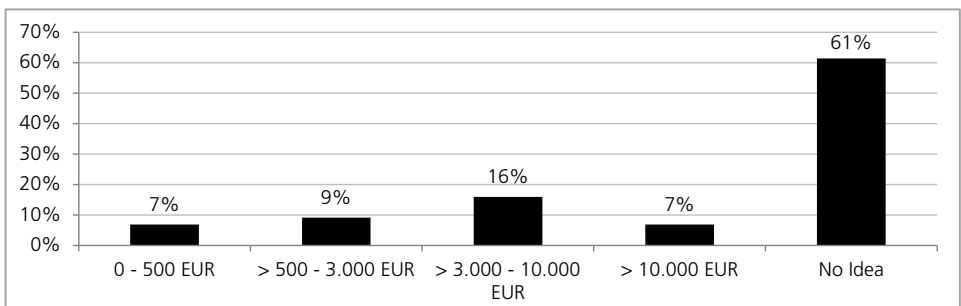


Figure 9: Expected costs for the transition to eIDs

4 Conclusion

Our empirical analysis of the requirements that service providers in the tourism and adult entertainment industry have for eID solutions has revealed several issues. The service providers in our sample don't see a pressing need to change their currently used authentication method to support eID technology – which seems understandable, as they don't encounter many authentication problems at the moment. However, they think that certain eID features could be valuable for their services. In particular, for the adult entertainment industry the possibility to obtain certified information is seen as a plus. An increase in transaction security is also seen positively. Thus, further development and marketing of the eID technology, as well as corresponding sample business cases should especially focus on these features. Our analysis of the hurdles showed that there is no ultimate reason that keeps service providers from implementing the eID technology. Only a few aspects from the tourism industry stand out. Respondents from this industry don't really see a need to change their services and are uncertain about the regulations in the eID context. They also fear that the transition might be inconvenient and expensive. All in all, the adult entertainment industry is more positive towards the eID technology. This fits quite well, as this industry is often an early adopter of new technologies. Focusing use cases and marketing on service providers of this industry when trying to introduce eIDs could therefore maybe help to establish the technology. The positive feedback resulting from the indirect network effects through an established base of users and service providers could then help to solve the “chicken and egg problem” and encourage the diffusion to other industries. As with any research approach our findings are subject to certain limitations. Noteworthy to this quantitative survey study are especially the comparatively small sample size, and the sample selection, which might lead to a possibly biased sample. The representativeness of the sample for the population of the two industries might therefore be reduced. However, we made the structure of our sample transparent and this study is only a first empirical analysis of the subject. The industry focus also has to be highlighted as a possible limitation, as the findings can't or only to a certain extent get generalized to other industries. So while these limitations are legitimate concerns given the chosen research methodology, they should not impact this paper's ability to give a first empirical insight into the subject. Moreover, they open possibilities for further research. It would certainly be valuable to extend the analysis to other industries and to extend the sample size. It also seems advisable to contrast the quantitative findings of this study with qualitative data, generated through in-depth interviews. The results of this survey can serve as a basis for this approach.

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