Invoice Financing on a Multi-sided Platform
An Action Design Research using Transaction Costs Economy

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Abstract – **Access to financing is a serious concern for many Small and Medium-sized Enterprises (SMEs) in need of cash. Invoice financing – in which a business sells its accounts receivables – has not been well adopted, seemingly due to the information intensive transactions that it requires. This paper describes the design of a digital Multi-sided Platform that provides invoice financing to SMEs to overcome this problem. It does this by deriving design guidelines from transaction cost literature and concurrently 'action designing' a live prototype. The results of the evaluation of the prototype show that the design is a promising solution for SMEs in need of liquidity, as it is being evaluated positively on the criteria aimed at lowering the transaction cost of invoice financing. More design research is suggested on the impact of a platform setup on transaction cost.**

INTRODUCTION

Access to financing is a serious concern for many Small and Medium-sized Enterprises (SMEs) in need of cash (Doove, Gibcus, Kwaak, Smit, & Span, 2014). For some this has become problematic because financial institutions have decreased their share of (short-term) loans provided to SMEs since the financial crisis (Berger, Cerqueiro, & Penas, 2014). Traditional bank loans have not been able to provide for this need of short term financing (Cole, 2012; Cowling, Liu, & Ledger, 2012; Valadkhani, Chen, & Kotey, 2014).

There are multiple alternatives for SMEs to fill their short term need to cash. One of them is a financial service called factoring, in which a business sells its accounts receivable –or invoices- to a third party and receives it cash immediately in exchange for a charge or fee. Factoring is diversely used in EU and it is limited accessible for SMEs (Klapper, 2006; Soufani, 2002). That factoring is not widely used by SMEs can be explained by the fact that it has a relatively high risk and information intensive transactions. This results that factoring is often considered as an expensive financing alternative, due to the high transaction cost. This not make it feasible for healthy SMEs to choose for factoring as a means of gaining liquidity (Soufani, 2000).

For other financial issues (such as seed-financing), the lack of financing possibilities has given rise to web- and data-driven financial products and services that offer more accessible financing (such as crowdfunding). These innovations allow SMEs to get access to financial services that they could previously not obtain from either their bank. At a rapid speed, primarily technology-driven companies are disrupting the financial industry (Accenture, 2013, 2014; Dapp, Slomka, AG, & Hoffmann, 2014), by simplifying what is complex, increase transparency, offer analytics, and reduce friction for mostly already existing financial services (Moldow, 2015). Many of these innovative companies set up their services through the use of a Multi-sided Platform (MSP).

Looking at these innovations it might seem relevant to have factoring solutions as well in a MSP setup. However, factoring can be a complex transaction for which some parts seem difficult to standardize and other parts require more intensive knowledge, than is the case for equity-based crowdfunding platforms. A few businesses attempted to scale invoice financing onto a MSP (Dailyfintech.com, 2015), however there has been little evidence of their success.

The general economical and managerial concepts of MSPs, are well discussed in economic literature (Hagiu & Wright, 2015). From an organisational perspective, MSPs can be defined as organizations that create value primarily by enabling direct interactions between two (or more) distinct types of customers (Hagiu & Wright, 2011). From a socio-technical point of view platforms are considered to encompass the technical elements (of software and hardware) and associated organisational processes that is an extensible base for development (De Reuver, 2015 (under review)). It is commonly argued that MSPs are able to reducing search costs and reducing shared transaction costs among its multiple sides (Baldwin & Woodard, 2008; Hagiu, 2009; Rochet &

Tirole, 2004). In other words a platform can provide a transaction with less friction.

There is currently limited knowledge however on what the implication of this premise of lower transaction costs should be on the design of MSPs. In order to understand this, transaction cost economy could be used as a theory to inform the design, commonly referred to as a kernel theory. Evaluating whether insights from transaction cost economy can be used in MSP design can contribute to general design knowledge. This is relevant, as - especially from an Information System (IS) perspective- there is limited empirically proven prescriptive general knowledge on how digital MSPs can be designed (Cronholm & Göbel, 2014).

This paper aims at understanding how a MSP can be designed to provide invoice financing to SMEs, by using transaction cost economy. By doing so it hopes to provide a solution for SMEs in need of liquidity, as well to contribute both to MSP design knowledge. The method used to understand this, is to design an actual MSP artefact for invoice financing. In order to structure the design research process the Action Design Research (ADR) method proposed by Sein, Henfridsson, Purao, Rossi, and Lindgren (2011) is used. ADR is a research method that is specifically focuses on designing an artefact in an actual setting, while contributing to knowledge for practitioners and to make theoretical contributions (Sein et al., 2011). The ADR method has been conducted to validate and refine the MSP, while designing it.

The rest of this paper is organized as follows. The next section reviews the literature on MSP design from a transaction cost perspective and a synthesis on existing MSP design knowledge is done to inform the design. Next, the design science method is described, and the MSP is described. This is followed by the results of its evaluation, from which generalized conclusions have been drawn.

LITERATURE REVIEW

There are different theoretical premises why MSPs seem to be successful. This paper mainly focusses on the transaction cost premise. First the transaction cost economy and its use to understand invoice financing is explained. Second, the views on the transaction cost premise for MSP success are elaborated upon. Third, a synthesis of the literature on MSP design for invoice financing is given.

TRANSACTION COST OF FACTORING

Transaction costs were conceptually introduced by Coase (1937) as "the cost of using the price mechanism"

(Coase, 1937 p.38). Following the later development of property rights (Allen, 1999), the definition became 'the costs establishing and maintaining property rights' (Allen, 1999 p.898). The later neo-classical economists focus more on the transaction demand for money and treat transaction costs as the costs of trading. This resulted in the more on trading oriented definition of transaction costs, which formulated as 'the costs resulting from the transfer of property rights' (Allen, 1999 p. 901). In the context of a business trade, the latter seems to still hold as a definition.

Transaction costs are seen as the negotiation, monitoring and enforcement costs necessary to assure that contracted goods and services between and within firms are forthcoming (Alston & Gillespie, 1989). More concretely, transaction costs include: contracting costs, which refer to costs that are associated to negotiating and writing an agreement; search and information costs, which include the costs of gathering information to identify and evaluate potential partners; monitoring costs, refer to the cost associated with monitoring the agreement; enforcement costs, refer to the costs associated with the ex post bargaining and sanctioning between the partners when a partner does not act according to the agreement (Dyer, 2002). Coase (1937) theorized that internalizing the functions within the firm would be dependent on the transaction costs that would occur with it. If the parties are required by competition to make highly specific investments in order to complete the transaction efficiently, then opportunism is more likely and hence vertical integration is more likely.

For factoring this principle can also be observed. Literature mentions two theoretical barriers of why factoring is currently only useful for SMEs that have a low asset specificity, and it would only be useful for in cases where there is a lot of information asymmetry between seller and buyer (Diamond, 1984; Smith, 1987). According to Smith (1987) one of the main reasons for this is because a seller who relinquishes credit management to a factor also "limits the ability to preserve the value of its specialized investment by designing timely and flexible credit procedures for troubled buyers" (Smith, 1987). In other words, the seller would not be able to get insights in this credit risk measure anymore which helps determining if payment difficulties are permanent or not. Thus outsourcing is the theoretical beneficial option.

The two barriers can be derived from this premise. Traditional factoring can therefore only feasible when the *asset specificity of seller is low*, as it would provide too much friction for a seller to outsource its accounts receivables because overall transaction costs would increase and *information asymmetry between seller and buyer is*

high, as the factor takes over the role of information intermediary. These barriers are only in place, given the high transaction costs occurring with factoring.

MSPs LOWERING TRANSACTION COSTS

MSPs are thought to lower transaction costs on traditional factoring for two reasons. First, the mere effect of the IT automation and second, platforms reduce search and information costs due to the fact that a platform provides an efficient way for one user to screen the other by providing the necessary information about the other (Tiwana, 2013).

To make use of the effect of lower transaction costs a certain scale is needed. According to Evans and Schmalensee (2013) an ignition takes place after the reach of the critical mass. When focusing on only a two-sided setting, the chance of finding a value-increasing interaction depends on how many agents of the first kind an agent of the second kind can reach and often vice versa.

Although the insights of Evans and Schmalensee (2013) are useful to understand when creating a customer acquisition strategy. However, they do not provide any insight in how the platform should be designed in order to get the benefit of lower transaction costs. Synthesizing literature on platforms with the notions from transaction cost economy, can help understand how this critical mass can be obtained and the benefits of lower transaction costs can be effectively designed for. Understanding this, in its turn, will be helpful during the design process of the platform.

IS DESIGN GUIDELINES BASED ON THEORY

In order to guide the design process design guidelines have been established based on kernel theories. These guidelines will be discussed in this paragraph. Tan, Pan, Lu, and Huang (2015) provides insight in how the design strategies might differ in different phases of the platform. They distinguish three stages. The nascent, formative and mature stage. As this research is about designing such a platform 'from scratch', only the first phase is taken into account.

Tan et al. (2015) argue that there are two main strategies for the starting stage of a MSP, which they call the nascent stage. The first strategy is to focus on the core and develop trust and a unique value proposition, the second is to mainly focus on the attainment of momentum in order to gain the critical mass as quickly as possible. Tan et al. (2015) suggest, it is wise to go for these strategies in the nascent stage of the platform development, as it enables to initially form a value-creating MSP and secondly they enable the previously mentioned network effects (Rochet & Tirole, 2004) to

take place, that help attracting platform members and actually reaching the previously mentioned critical mass earlier. From this, the following design guideline has been formulated for MSP design.

Design guideline 1: *Dedicate all IT efforts to 'building platform trust' and 'attain momentum'*

In order to obtain momentum, general management theories show that focusing on underserved markets is a good strategy. The prerequisite that asset specificity must be low is not per se valid on a mature MSP, as there would be little emphasis on the outsourcing of the accounts receivables and more on the gain of liquidity. In this specific case the overall transaction costs would thus not increase for cases where a seller's asset specificity is high. Although a nascent platform still needs to grow these benefits, it can already internalize the transaction costs. By doing so, the higher asset specific companies can already be served and momentum can be gained.

Design guideline 2: *Focus on new target groups with higher asset specificity*

The reason for that is, that in highly decentralized markets, information asymmetries are amplified because the lending process in digital environments is almost faceless and close to anonymous (Wang, Wang, Kang, & Sun, 2014). By building in incentive mechanisms, linked to the amount of information that a seller can provide on its customer (thus having a low information asymmetry), a seller with good understanding of its own customer's situation would still be eligible for a factoring setup on the platform.

Design guideline 3: *Promote information sharing*

In order to gain trust on peer-to-peer lending platforms Wang et al. (2014) created an empirically tested trust based model. Wang et al. (2014) show that the ease of use and usefulness of the platform is of importance. This lies in the same line as the Technology Acceptance Model (TAM), which is a generic model that has been used very often to conceptualize the acceptance of certain technology. Though criticized, the TAM model has often showed to be useful determining the factors that facilitate the use of information systems (Legris, Ingham, & Collerette, 2003). Therefore ease of use and usefulness are taken into account in this design guideline 4, which is applied in the establishment of the requirements.

Design guideline 4: *Set goals for and measure the platforms perceived ease of use and perceived usefulness*

Structural assurance improves the trust on the platform, which allows for more adoption of the platform. The perceived privacy is also a real concern here. Wang et al. (2014) showed that privacy issues on peer-to-peer lending platforms can be of serious concern. Therefore both of these aspects needs to be taken into account while designing the platform.

Design guideline 5: *Set goals for and measure the platform's perceived structural assurance and perceived privacy protection*

The platforms reputation can should be measured, as well as the directly related external parties with which the platform is connected (module providers e.g.) should be considered to be trustworthy by the users. The social influence can also be obtained by being present on social media platforms for example. These things need to be taken into account throughout the design process.

Design guideline 6: *Set goals for and measure the platforms positive reputation, links with trustworthy third parties and the social influence.*

Having extracted these guidelines from transaction cost theory has helped to shape the design of the MSP. The method of designing and evaluating the artefact is now described.

METHOD

By introducing a functional IT artefact, instead of only learning from the meta-concepts, primary data on design science if provided. By designing a concrete IT artefact it distils from that experience prescriptive knowledge. This knowledge is packaged into a general solution concept for multi-sided platform design in the financing industry.

In pursuit of solving the SME financing problem, it is important to know whether the design will actually be used. Also, due to the fact that this research is conducted at a start-up the relevance of the solution will be of critical importance for the success of it. On the other hand, this research can contribute to the design knowledge base specifically on MSPs and factoring. In order to achieve both, the design challenge will be solved by creating a specific solution for the Swiss market from which learnings for both practice and academia can be taken.

DESIGN METHOD
This type of research is in line with the Design Science Research (DSR) methodology, as this type of research aims to serve these two goals. The first goal of DSR is to guide design and evaluation of artefacts (Sein et al., 2011; von Alan, March, Park, & Ram, 2004) and the second is to fill the gap between responding to the need of practitioners and research rigor (Gallupe, 2007). There are multiple DSR methods, but Iivari (2015) argues that two main strategies can be identified. In the first, a researcher constructs an IT meta-artefact as a general solution concept to address a class of problem and in the second, the researcher creates a concrete IT artefact in a specific context. Because, especially in the case of the second strategy, it would be beneficial to have more carefully conducted *strategy 2* research projects in the future (Iivari, 2015). Because there is less known about the second strategy, it is more risky to take this approach. Nevertheless, this research is following that strategy, because it better fits the dynamic context of the research.

In order to structure this process the Action Design Research (ADR) method proposed by Sein et al. (2011) is used. ADR is a research method that is specifically focused at designing an artefact in an actual setting, while contributing to knowledge for practitioners and to make theoretical contributions (Sein et al., 2011). Although, theoretically ADR is a good methodology, it currently still lacks empirical evidence based on primary data (Cronholm & Göbel, 2014). That is, the empirical grounding in these methodologies is based on secondary data, not on primary ADR research. Thus, more specifically, by providing a specific case of ADR in an actual setting, this research contributes to better prescriptive design knowledge.

Taking into account the ADR method, this study is being performed in one cycle. The cycle will contain the following stages 1) Problem Formulation, 2) Building, Intervention, and Evaluation (BIE) 3) Reflection and Learning and 4) Formalization of Learning. Within the BIE process this artefact is developed and thus it should be further be defined how this BIE process will be applied According to Sein et al. (2011) there are two approaches to this development process either an IT dominant process or an organization dominant approach. Due to the high complexity and sensitivity of the problem that has been solved, it would have been very difficult to directly test the alpha version of the platform with the sellers. Therefore the more IT dominant process could be chosen, in which the possibilities to implement all needed aspects of factoring on the platform and tested all aspects internally, such as the usability of the features that have been designed through mock-ups, which are non-functional representation of the platform pages created for testing purposes. However, the prototype has also been evaluated lightly with the end-users.

EVALUATION METHOD
During the artefact designed the design process will be evaluated, so conclusions can be drawn on the fitness for

purpose of the design process. The evaluation methods are described as three phases.

First, in the domain analysis, 26 semi-structured interviews and a domain survey send to approximately 100 SMEs was used to evaluate the main assumptions. By applying a transaction cost perspective on platforms it is assumed that certain costs in the current factoring transaction is withholding people to use factoring as well as letting SMEs being unsatisfied with certain aspects of the transaction. By doing so the premises on which the theoretical evaluation criterions are based are tested. To further pin-point the problems with factoring, user interviews with SMEs and a domain survey have been executed.

Second, in the structural specification phase, the platform design theories are used to guide the establishment of the structural specifications. It answers the question: given the need for short term financing, what should the conceptual design (architecture and organizational arrangements) of a factoring platform look like, from both a technical and an organizational perspective? For the technical perspective of the design, mainly the core platform theories have been used. They are used in the setup and evaluation of the mock-up and the semi-structured interviews that were conducted to evaluate these mock-ups. The design guidelines based on the transaction cost economics are being taken into account mainly in the organizational perspective. Both theories are used to design the organizational arrangements of the structural specifications. This is done as it is mainly concerning the inter-organizational aspects which can be improved by the guidance of these economic theories. In order to lower the transaction costs a certain organizational setup needs to be designed which allows for the whole process to become digital and at the same time improve trust.

Third, in the platform prototype phase, the platform theories are used again to design the technical parts of the prototype and set up the pilot testing. It is answering the following question: does an digital factoring platform prototype, which follows the design requirements, enable financial investors to provide invoice financing to small and medium-sized enterprises? Now the organizational perspective of the design is only relating to the way the prototype is implemented within the start-up. The agile software development method has been used to explain this perspective. This phase is evaluated by the experiment and prototype survey send out to SMEs and a log data analysis. The survey contained questions that were based on trust antecedents that are formulated by Wang et al. (2014). In the evaluation, the focus lies on the transaction costs that occur in using the platform.

THE PLATFORM DESIGN

Using the design guidelines from literature, the platform has been designed. As like many FinTech companies (Moldow, 2015), the design aims at simplifying what is complex, increasing transparency, offer analytics, and reduce friction for the already existing financial service. In order to provide an architecture for the ecosystem an overview of the ecosystem is provided. The different modular parts and the different user groups have been structurally presented in Figure 1.
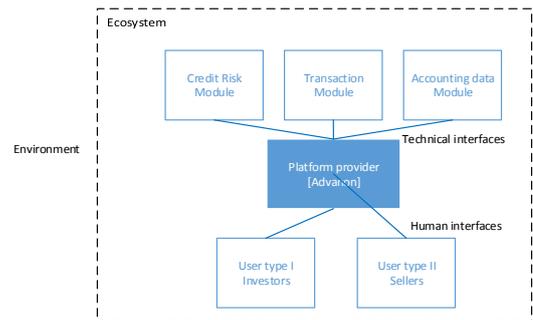

FIGURE 1 THE OVERVIEW OF THE ECOSYSTEM ARCHITECTURE

More from a technical point of view the application and infrastructural architecture has been created. These are shown in the component diagram in Figure 2.
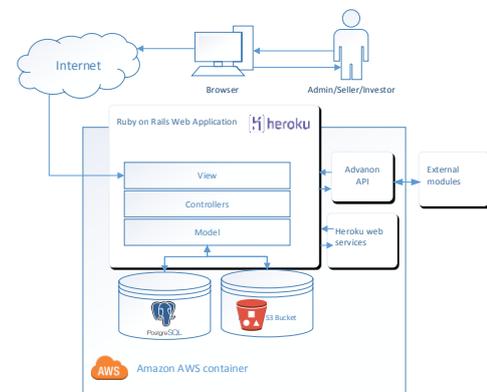

FIGURE 2: COMPONTENT DIAGRAM OF THE TECHNOLOGICAL ARCHITECTURE OF THE PLATFORM

Within the architecture *open interfaces* have been created on the basis of which the platform allows for extension. It was one of the learnings from platform theories that this could be used. Two types of interfaces can be identified: technical and human or user interfaces. Both are briefly discussed.

TECHNOLOGICAL INTERFACES

In order to design the ecosystem, the platform needs to have technological interfaces with the different modules. Furthermore, the interface with the platform users,

which can be referred to as the user interface. The structural specification of these interfaces is discussed. In order to establish the technological interfaces, certain standards and processes are designed in order for later development to have standardized interfaces to foster platform adoption.

Transactional interface. The industry standards of transaction protocols, in Switzerland SEPA and DTA, are investigated and used to determine the architecture of storing the transaction instantiations. For the manual set up, where the users perform the transactions themselves instead of one of the module providers, manual buttons have been designed.

Credit rating and Accounting data interface. The process of gaining credit data that allows for a good prediction of the default rate of a company is often a tedious process (Mester, 1997). Although it is difficult to create trustworthy credit scorings, it is one of the essential parts of the underwriting process of a transactional loan, including factoring (Berger & Frame, 2007). The industry uses a very large variety of standards and methods of creating credit scores. This makes it difficult to create standards for all possible ways. Al though the calculation of the score is often varying, the way is similar and makes usually makes use of a diversity of ratios (Mays, 2004). Therefore, in order for data providers to offer their services through the platform, there should be a possibility to link this data with the internal database. A lot of research has been done on the credit risk process and the available information.

USER INTERFACES

In order to rapidly understand the way the platform would be interpreted by the user, mock-ups have been created. The mock-ups have been used in the semi-structured interviews with the users and been improved by several iterations. An example of the mockup is shown in Figure 3 Mock-up on the overview page of the seller side platform user interface.
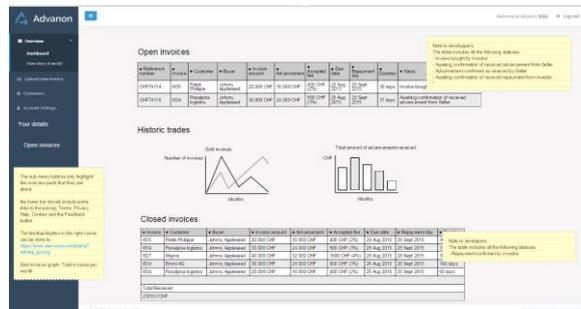

FIGURE 3 MOCK-UP ON THE OVERVIEW PAGE OF THE SELLER SIDE PLATFORM USER INTERFACE

This mockup has been implemented also as a functioning platform in Ruby on Rails. Figure 4 shows a screenshot of the functioning implementation of the mockup, which has been iteratively improved with user involvement.
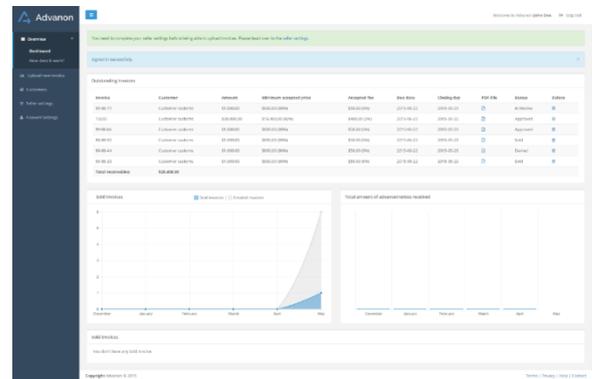

FIGURE 4. THE DEVELOPED IMPLEMENTATION OF THE OVERVIEW PAGE OF THE SELLER SIDE PLATFORM USER INTERFACE

ORGANIZATIONAL ARRANGEMENTS

As the initial version of the platform has two user types, there exist three social relations between the platform and its users, there are three main social relations for which specific rules need to be designed. These are as follows.

Social contracts between the Seller-Investor
Following design guideline 2, the seller should be longer responsible for its own debt collection, in order to allow for a higher asset specificity. This means that the invoices will be sold *with recourse*, in which the seller of the invoice stays responsible of collecting it. For this, special contract have been set up in order to provide the investor with the safeguard that adverse selection (see literature chapter 3) takes place.

Social contracts between the Seller-Platform
The seller should allow insights in the details of its customer information. Although, never fully controllable, this should be embedded in the contracts, as this will be beneficial for the information asymmetry between the customer and the factor. Furthermore, the moral hazard of providing bad invoices needs to be covered as well. By ensuring this, the factor, already having external information from the modules, will be enriching its own data with that from the seller. Thus, as mentioned above, the platform should be focusing on factoring setup with recourse.

Social contracts between the Investor–Platform
In order to create the trust that is needed for an investor to invest, the social contracts need to be set up as such that there is an aligned interest between the investors and

the platform. This can be done in multiple ways, but the most prevalent is to both share the positive and the negative returns/defaults on an invoice. Also, it should be clear to an investor that the platform provider is taking all precautions needed to include the best invoices on the platform. However, it should also be stated clearly that the platform provider is never legally liable in case of an unfortunate default of an invoice. Thus it is clearly stated what the duty of the platform is regarding this and, maybe more importantly, what is not.

EVALUATION

Evaluating has been done on the fact if the artefact is sufficing its requirements and whether insights from transaction cost economy has been useful in the MSP design. Firstly, a domain analysis has been performed in order to verify the assumptions on the liquidity problem of SMEs in Switzerland. From the results hereof can be concluded that the problem of liquidity and cash flow management indeed was a problem for a portion of the SMEs in Switzerland. Only some changes to the requirements have been made based on these outcomes.

The structural specifications have been evaluated by semi-structured interviews that were mainly focused around the mock-ups. The mock-ups were used to identify whether the design guidelines had made up the architecture and the organizational arrangements to also fit the need of the users. Because of the insights from the user feedback on the mock-up certain design requirements had not yet been fulfilled. The main insight that came from the interviews was that the design should allow for easier customer information sharing. This has later been followed up in the development of the prototype.

After building the prototype, a prototype survey has been send out of which the results are presented in Figure 5 and Figure 6. The questions in the prototype survey both contained questions on the main features its usability and the antecedents of trust, which are adapted from Wang et al. (2014). The latter provided a good way to measure the trust on the platform. First the questions on the main features are presented in Figure 6.
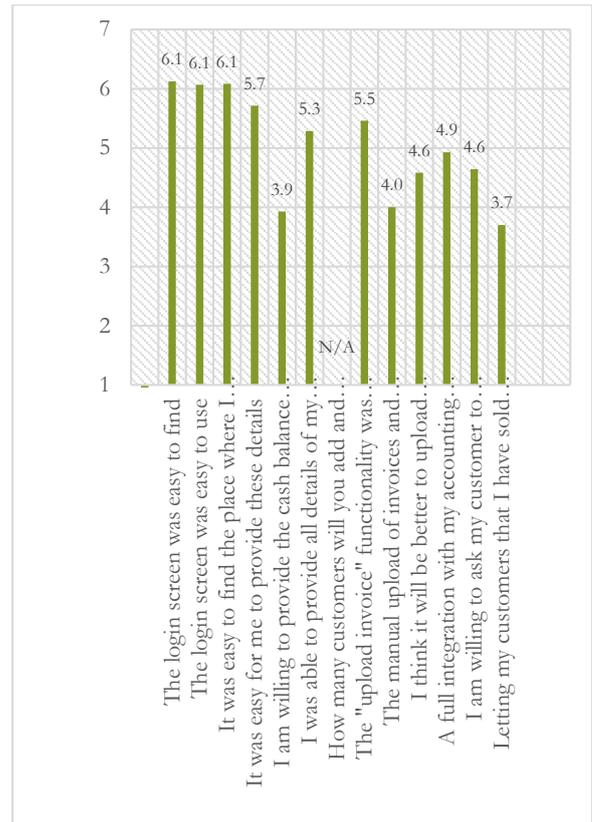

FIGURE 5 MEAN RESULTS ON THE PROTOTYPE SURVEY ON THE FEATURES (FORMATIVE EVALUATION), N=17

The results of the feature specific questions are shown in Figure 5. It shows that the willingness to provide the cash balance would be a problem that requires attention. Furthermore, the manual upload of invoices is not a real barrier for most of the respondents, however, it was derived from the interviews that some sellers who wanted to upload large amounts of invoices (which is good for the security of the investments and thus should be stimulated) did feel this as a problem. In order to have all features functioning according to user requirements, these issues would need to be solved.

On top of the formative evaluation on whether the user valued the usefulness of the theoretical based design guidelines. The specific questions were constructed as depicted in Table 1. All questions were adapted from the research from Wang et al., (2014), which indicated that there is a strong likelihood that these factors determine the trust on a financial platform. The means of the result on the questions on trust and institutional risk have been presented in Figure 6.

Table 1 Overview of constructed questions on trust and institutional risk

Factor	Questions*
Perceived usefulness	I believe it is easy to get Advanon[1] to do what I want it to do Learning to operate Advanon is easy for me Overall, I believe that the platform is easy to use
Ease of use	Using this platform would make it easier to gain liquidity Using this platform will enhance my effectiveness in improving my cash balance Overall, I find Advanon useful
Structural assurance	If I were to use Advanon, I will not be concerned about whether it will take care of lending security (e.g. the Lending Agreement) I am concerned about whether Advanon will prevent fraudulent users from undertaking lending activities
Institutional risk	I feel confident that encryption and other technological advances on the Internet make it safe for me to do business there In my opinion, the Internet is now a robust and safe environment in which to transact business.
Perceived reputation	I believe that Advanon has the necessary technology knowledge to carry out online lending I believe the chance of having a technical failure on Advanon is quite small
Perceived privacy protection	I do not think that Advanon is collecting too much personal information about my company
Trust	My tendency to trust a person/thing is high Personally, I get the feeling Advanon is genuinely concerned about me Overall, I trust Advanon

[1] Advanon is the name of the platform that has been evaluated.
* All factors and questions have been adapted from Wang et al., 2014
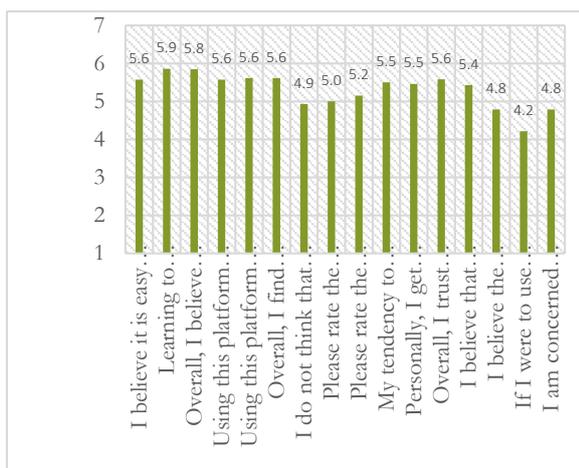

FIGURE 6 MEAN OF RESPONSES OF QUESTIONS ON TRUST AND INSTITUTIONAL RISK ON A 1-7 SCALE, N=17 (SUMMATIVE EVALUATION)

Based on the results of the summative evaluation questions on trust and institutional risk, the degree in which the artefact suffices the first (1), and the last four

design guidelines (3, 4, 5 and 6) can be *indirectly* deducted. In order to understand whether these questions actually have been filled in higher than the expected median value of 4, a one-sample Wilcoxon signed rank test has been performed. For this test to be performed the data should be of at least ordinal scale, which is the case for this sample. The results of this analysis made it, due to the low number of responses, to perform a factor analysis and determine the exact impact of the different factors.

However, it should be noted that all the separate variables had a significantly diverging median from 4, except for the two questions on technical failures, which are part of the structural assurance. This implies that the technical failures on the website had the biggest impact on the users, causing them to not be as satisfied with this, as with the other constructs. Overall, we can conclude that the design guidelines made sure that the platform scores relatively high on the factors that determine the trust in the platform. As literature suggests that trust is one of the major determinants of the success of a platform, these results show that the artefact sufficed the theoretical criteria.

DISCUSSION

This research has some limitations, which are discussed here. Although this paper presents the results according to the setup of Verschuren and Hartog (2005), it actually followed the ADR method. This means that a certain abstraction has been done in order to present its results. They way this is done can be improved, but it would require future research on praxis oriented design studies to make generalizable conclusions on this.

In order to fill this gap a certain research aimed at, while designing a platform for a specific domain, to gain fundamental knowledge on the problems barriers that currently exists for that solution that could be solved by re-introducing it in a platform setup. As the design focusses specifically on the design of the complex phenomenon factoring on a digital platform, it helped to first investigate more traditional theories on transaction costs. By taking this fairly fundamental economical view on factoring, the theoretical barriers and constructs of opportunistic behavior are explained that currently exist within the factoring solutions. It helped to understand the logic behind why factoring works or why it does not work in certain situations and what types of opportunistic behavior needs to be taken into account when designing the platform.

Platform theories helped to understand mainly why platforms can be beneficial from an economical or management point of view. There currently still is a gap

in the publications for prescriptive design knowledge on platform design. The literature review on financial platforms showed that there are numerous platforms being created and more and more business models adopt certain elements of platforms. However, the IS design literature mainly described a technical definition of a platform being an extensible code-base. Although, a product platform like this has brought insights for the Advanon platform architecture, it did not provide enough knowledge on how platforms should be designed and developed for the purpose of growing out of the nascent phase.

While trying to synthesize the learnings from platform and transaction cost literature, two of the most useful (both for developing the design guidelines as well for structuring the evaluation questions) was the works of Tan et al. (2015) and Wang et al. (2014). The first provided insights in the main strategy that an early stage platform design should be taking. Obtaining trust and momentum were a useful insights to focus within the design process. Secondly, Wang et al. (2014) provided good inputs for the design guidelines and evaluation of the prototype. By using the factors that influence trust, a survey could be held that evaluated the platform trust in a more elaborate way.

Although the research was a good first attempt of using a transaction cost perspective in platform design, it was currently not possible to directly infer the effect of the multi-sided platform on the transaction costs. Although indirectly the indications are that the platform will, there will be more research needed into determining or even quantifying lower transaction costs on multi-sided platforms. Also, it is recommended that the ADR approach is further expanded. Especially guidance is needed on how a continuous literature review can be implemented within the design cycle. This case shows that learnings are often implicitly used, however the presentation of a literature review in a scientific paper is expected to have a more structured approach. The principles of ADR do not provide a solid answer for this.

Conclusion

This paper aimed at answering how a MSP can be designed to provide invoice financing to SMEs, by using transaction cost economy. Five design guidelines from literature on factoring and MSPs from a transaction cost perspective are identified. Using these design guidelines, through an iterative design cycle, the platform artefact has been constructed into a live prototype. Three main phases in this design cycle have been evaluated both formatively as well as summative. The results from the formative evaluation show that the platform features suffice the design requirements and are being valued for its ease of use and usefulness by its users.

This paper shows that reviewing such a fundamental theory evaluation criteria for invoice financing on a platform can be useful to guide the design. Justificatory knowledge on transaction cost economics could be used to understand the problem of traditional invoice financing better. Concluding, this paper provides a promising solution for SMEs in need of liquidity, and as well contributes to MSP design knowledge. More design research is suggested on the impact of a platform setup on transaction cost in other areas.

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