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Gaining Trust Advantage for the Vaccination Certificate Platform

Liina Joller[1]

Abstract

Purpose: In the conventional international health and safety policy design, the decision makers rarely think in terms of business models. As an example, the yellow paper-based vaccination certificates, initiated and implemented by the WHO in 1969, have not changed very much since then. In 2020, the Covid-19 crisis accelerated innovation, particularly digitalisation, in many sectors, and the sense of urgency to have a digital immunisation certificate was voiced by many governments, as well as corporations. The new solution must enable international interoperability, but it is a challenging task because the setup of health registries varies across countries and because the common actions have been hindered due to the lack of trust – the trust deficit.

Approach: In this article, the case is discussed in the platform business model framework, and the role of trust in gaining competitive advantage – the trust advantage – in its fast and widespread adoption is particularly exemplified. The case was analysed in parallel with the discussions and actual development, not *ex post*, as common in business model literature.

Findings: The solution that could be capable of overcoming the privacy and security concerns that have been brought up in the international discourse can be described as a decentralised multisided platform, which has a distributed management system. The platform's standardisation would ease its global uptake, and the strategic partnerships with countries, organisations, and firms that are already considered trustworthy (possess trust credit) will have the opportunity to gain trust advantage.

Limitations: This paper was written having the managerial perspective in mind, hence, it does not go deeply into all technical and legal aspects affecting the implementation of the digital vaccination certificate platform. It was written in parallel with the vivid disputes in the international arena. By the time this article was finished, the first pilots had just taken off and it was not clear yet which of the technical solutions and business models will eventually become dominant.

Keywords: business model innovation, platform business model, trust advantage, distributed trust, interoperability, innovation policy

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Introduction

Platform-based business models are emerging at a fast pace. So far, they have been successfully established in many sectors in order to communicate, co-innovate, exchange data, goods and services. However, in health-related sectors their diffusion has been lagging behind, and one of the main reasons for this could be the trust-intensive nature of health data. The overall increase of trust deficit in society has hindered it even further. It should be emphasised in the beginning that this article does not address the trust towards a vaccine *per se*, but towards a platform-based ecosystem that is handling health data – the individual's vaccination records. The setup and operation of this ecosystem are addressed from the platform-based business model perspective.

This case study focuses on the development of a multisided platform that enables sharing information about the individual's vaccination status[1]. In this article, the 'platform' is defined as a nexus of rules and infrastructure that facilitate interactions among network users (Eisenmann, Parker, and Van Alstyne, 2011), and in this case offering value as a central interoperability service. In the public discourse the vaccination certificate has synonyms, e.g. green certificate[2], immunity passport, etc., but as it is not an official travel document, the word 'passport' is misleading. For the new platform to be able to replace the yellow paper-based vaccination certificates[3], initiated by the WHO and implemented by individual countries in 1969, a commonly accepted global digital approach is needed. As times of uncertainty may provide new opportunities for business model innovation (Aagaard and Nielsen, 2021), the Covid-19 pandemic could be a much-needed trigger here.

[1] Although traditionally the immunity certificates have been used for verification that the individual has received a vaccine, the same data exchange platform can also be used for verification of the existence of antibodies, or that the person has tested negative a few days before the travel.

[2] EU Green Certificate [https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/safe-covid-19-vaccines-europeans/covid-19-digital-green-certificates_en], and several similar regional and national initiatives.

[3] International certificate of vaccination or prophylaxis [https://www.who.int/ihr/ports_airports/icvp/en/]

In order to gain ground, the management (orchestration) of the platform is crucial, as its successful implementation will require a critical mass of users. The tactical steps should therefore consider the platform development phase and respective critical success factors (Trischler, Meier, and Trabucchi, 2021). To take off, the users and all other stakeholders need to have trust towards the platform leader, each other, and the technology. The trust in the whole platform may still be vulnerable to psychological manipulations, even if the technology behind it is proven to be secure. This has given a reason to say that a new form of trust is needed (Werbach, 2018), and this article aims to contribute to building this knowledge stream.

The extant literature predominantly addresses the trust between individuals or the trust between firms (see also the review by Fulmer and Gelfand, 2012), but these streams have not been well interlinked. There are fewer studies about how individuals trust companies, or more specifically, discussing trust towards different types of business models. As the trust has been used to explain human choice (Miller, 1992), it could be claimed, of course, that partly it is covered in marketing studies. However, there it is also usually addressed indirectly.

From the literature, it can be summarised that the precondition for trust to be meaningful rises from risk, which further comes from interdependence (Rousseau, Sitkin, Burt, and Camerer, 1998). The actual or cognitive risks can be associated with change, the deviation from the *status quo*, which in the case of the digital vaccination certificate are exemplified in Table 1. The perceived interdependence-related risks come from digitalisation, data storage and transfer, particularly from sharing the responsibility of ensuring security and transparency in this process. However, objectively the distributed ledger technology (DLT) and decentralised management can actually reduce risks.

In the platform business model, interdependence is unavoidable, moreover, it is actually an enabler of the main source of its competitive advantage over traditional two-sided business models – the network effects. However, it is a business model design and

implementation challenge where the relationships between stakeholders are quite complex, and motivations often intertwined.

So far, the literature (Parker and Van Alstyne, 2018; McIntyre and Srinivasan, 2017; de Reuver, Sørensen, and Bahole, 2018) addresses mainly platform-based interactions where the platform sides are either firms or individuals, leaving the role of governments and intergovernmental organisations aside. Although the individuals, ICT companies, vaccination clinics and large pharma companies are all part of this extended ecosystem, the market uptake and diffusion of the interoperable digital vaccine certification platform depends first on governments and intergovernmental agreements (including global intergovernmental organisations). Of particular importance is their ability to reduce perceived risks, and enable trust to be built and sustained, which is crucial for the emergence of network effects.

If implemented, the digital platform can replace the current yellow printed vaccination booklets on borders, as well as ease domestic travel, access to campuses, large events and corporate buildings. In the long term, the underlying DLT and its multisided platform business model creates even more e-governance opportunities.

In this article, the case was addressed at the meta-model level (Massa, Tucci, and Afuah, 2017), and is based on interviews with the visionary and technical people behind it. The data collection as well as the theory building followed the principles of grounded theory (Strauss and Corbin, 1994), and the researcher was interacting with the platform's team during its development.

The article is set up so that the description of the development of a case is intertwined with relevant theoretical standpoints, especially from the rich literature on the phenomenon of trust, and lessons from commercial platform business models. It starts with explaining the essence of a multisided platform business model and continues by discussing the different facets of trust. Thereafter, these streams merge to bring out the importance of trust – the trust advantage – for the success of a platform.

Background of the Digital Vaccination Certificate Platform

The writing up of this case study occurred in parallel with its implementation endeavours, not *ex post*, as is common in business model literature. The development of the digital vaccination certificate platform started in 2019 (*i.e.* pre-Covid-19) as one of the sub-projects of the Estonian X-Road platform[4]. The idea came from the Nordic Institute of Interoperability Solutions and was promptly picked up by the Estonian government strategy office. The WHO[5] also acknowledged the need, which gave a boost to the IT developers in Estonia and Finland who initially took up the challenge as a non-for-profit side-task. However, the most critical aspect, the approach for bringing it to actual use (Gawer and Cusumano, 2008) with all of its possibilities, was not so clear at the beginning. The term 'approach' is used consciously because people making international health policy agreements usually do not use business model terminology or think in the platform business model framework.

As the first contributors were predominantly ICT firms, many with extensive experience, then technically there was probably quite a good understanding of what the critical features of the solution could be – interoperability, personal data protection, time stamping, etc. However, it is known that inferior technical properties can be overplayed by a superior business model (Amit and Zott, 2015), so the latter required thorough attention as well.

The aim was no less than to create a global standard for exchanging data about an individual's vaccination status, where the international interoperability is based on a distributed data governance model and decentralised management. The key principle and guidance for developers was "the simpler, the better". The envisioned approach would fall under a platform architecture logic, although so far the platforms have been used, as well as addressed in the literature, primarily in the business context.

[4] Nordic Institute for Interoperability Solutions [https://x-road.global/]

[5] World Health Organization [https://www.who.int]

Table 1.

Paper-based yellow vaccination certificate	Digital vaccination certificate platform with de-centralised management and based on distributed ledger technology
Both contain entries about every vaccination event (injection made by whom, where and when, often accompanied with vaccine name and batch number).	
Entries (and vaccine injections) are made by qualified personnel in accredited clinics.	
Requires presenting an official travel ID (passport) to match the person with the vaccination records.	
The border officer can browse the whole paper-based vaccination certificate.	Only the necessary data can be made visible, i.e. if a border officer should check for Covid-19, then only relevant data can be made visible.
An individual covers the costs of issuing the blank paper-based vaccination certificate.	An individual may cover the costs of keeping the digital ledger, but it may be also covered in full by the government. The financial model still needs to be agreed upon and can differ across countries.
Can get lost.	Cannot get lost.
Not tamper-proof. Signature, stamp, batch sticker rather easy to replicate.	Tamper-proof. Timestamped, irreversible, and encrypted data entry and transmission.
Paper-based records can be duplicated in the national electronic health registry and then they are also remotely accessible to doctors in the same country.	Enables international interoperability and communication between national IT systems, accessible abroad and valid in all participating countries around the world.
Needed for travelling to a limited number of countries, mainly in Africa and Asia.	Since 2020 Covid-19 pandemic affects all travellers around the world.

Table 1: Similarities and differences between the digital vaccination certificate platform and the established paper-based yellow vaccination certificate

The Platform Setup

The setup took advantage of the participating ICT companies' existing competences in blockchain and similar DLTs, which enable features that would not have been possible even a decade ago. There is no need for a central global database that could be a target for a cyber-attack. Instead, during the check for vaccination status the inspector makes inquiries to the platform, which further communicates with the national databases that keep the records made by the nationally certified vaccination clinics (Figure 1). Hence, the primary role of the digital vaccination certificate platform is to be a transaction platform, where data is the transaction object. For quick and wide diffusion it is important that no specific hardware or software should be needed to check the vaccination status. Therefore, the identifier, a QR or barcode, which is unique for each injection or vaccine dose, should be readable even with a mobile phone scanner.

The setup is based on the open technological standard and standardised, default contracts, which have been considered as essential elements of the platform business model (Parker and Van Alstyne, 2018; Eisenmann, Parker, and Van Alstyne, 2009) and a cornerstone of its competitive advantage. The paradox of openness (Schmeiss, Hoelzle, and Tech, 2019) has been considered as one of the main challenges in setting up the platform ecosystem – finding the right balance between openness and control for maximising value to all members. In the case of the digital vaccination certificate, the platform would be eventually open to all countries. However, a smaller group would be used for the first piloting round. Similarly, it would be usable to all individuals residing in, or travelling to and from, these countries. Similarly, the platform should be open to all vaccination clinics that are certified and as of today working with paper-based certificates.

The openness does not reduce the value here in any way, in fact, it increases it. The 2nd level complementors, e.g. other ICT firms that wish to build their applications on the same platform later on, should be required to fulfil some credibility criteria, in order not to compromise the trust towards the whole ecosystem. Therefore, it could be said that the digital vaccination certificate is a semi-open platform, i.e. the platform leader retains control over who can become a complementor.

In the business context, the platform technology and created data are usually proprietary (Teece, 2017), and the platform leader prefers to keep control over it, to be able to ensure that the trust towards the platform is not abused. In the case of the digital vaccination certificate platform, there is no creation of proprietary data that could cause ownership disputes between the platform ecosystem participants or be an obstacle for any country joining the system. In legal terms, the individual remains the owner of the data, and the national regulations of its use will prevail.

Forming the Ecosystem

Following the nested hierarchies of systems, as suggested by Massa, Viscusi, and Tucci (2018), compared to the business model of a single firm, the platforms are systems with a higher level of complexity. The

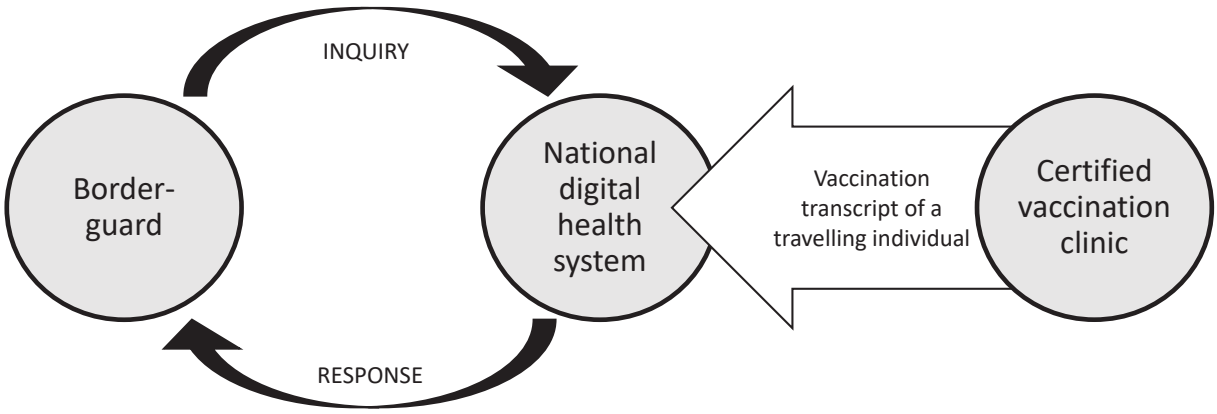

Figure 1. Inquiries and data flows on the digital vaccination certificate platform

stakeholders of a platform altogether form an ecosystem, in which they ideally would be complementors – covering all the crucial competences and resources. The platform typically has a single leader (sometimes referred to as an orchestrator), who is responsible for the governance of the platform ecosystem (Wareham, Fox, and Giner, 2014). The governance comprises mainly execution and secure record-keeping of the transactions, and their validation. It encompasses setting rules, the control mechanisms that would act as a deterrent from opportunism (Rousseau *et al.*, 1998), and creating the incentives that would keep all parties motivated. The appropriateness of the incentives is crucial for the fast emergence of network effects (Casadesus-Masanell and Zhu, 2013).

In the case of the digital vaccination certificate platform, during the launch the leader's role was distributed among the participating organisations, mainly visionary incumbent ICT firms, and untypically, an important role was played by the Estonian government (Figure 2). In this platform, two groups of end-users interact with each other – the national border-crossing unit officials and the individuals who need to travel abroad. The complementors, who build their products and services to be offered via this platform, are no less important. Some of the complementors can be essential for the platform to exist, and some more 'complementary', providing convenience features. In this case, the essential complementors would be the vaccination clinics. In business model terms, this leads to a service-service bundle value proposition, as giving the vaccine is the first service, and keeping a verifiable record of the vaccination data is the accompanying service. The second wave of complementors could include ICT firms with various foci – in principle the open standard would allow building any kind of new e-governance solutions on it.

For the platform to exist and run smoothly, system integrators (external service providers) might also be necessary. These are the ICT support companies that help to install (if necessary) and provide training for the platform users or complementors, e.g. border guards or vaccination doctors.

Even when the core ecosystem members are in place, the selection of additional external partners can be critical as well. They can be particularly valuable in creating trust towards the platform, as we will explain in the next sections with an example of the role of the WHO in launching the certification systems.

Creating Trust Towards the Platform

Trust is a phenomenon that has been described as an antecedent, outcome or moderator (McEvily, Perrone, and Zaheer, 2003). Among the many conceptualisations of trust that can be found across

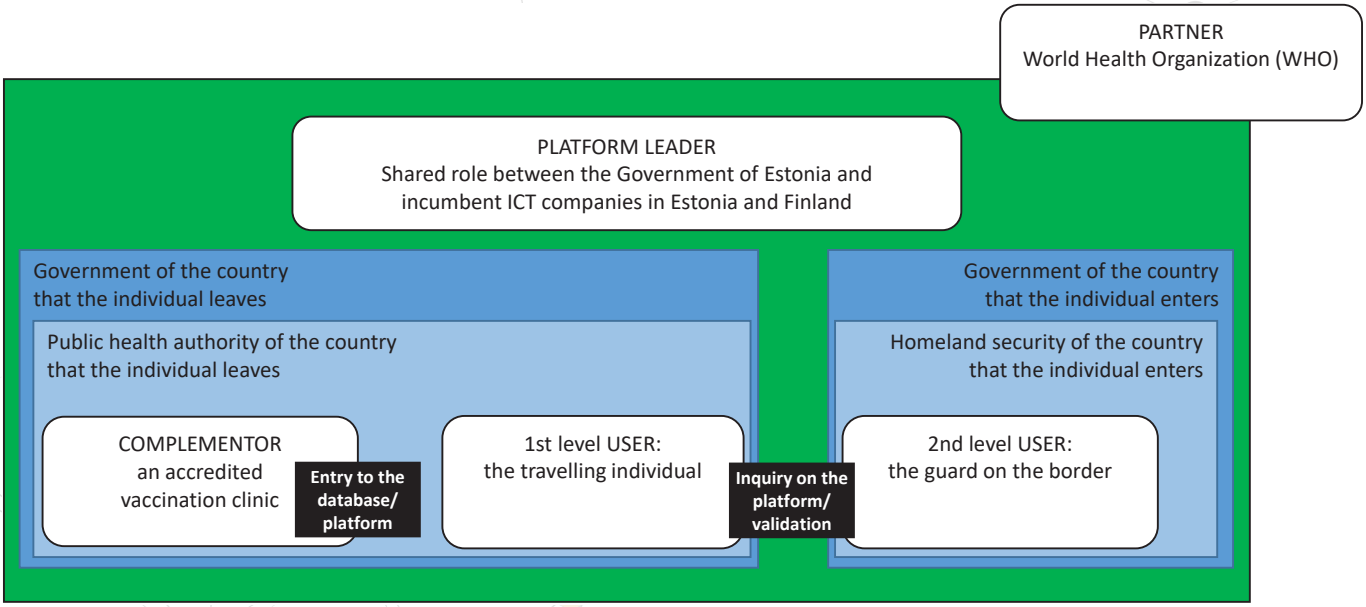

Figure 2: The ecosystem of the digital vaccination certificate platform

disciplines, it has been attributed to the trustor's belief in the trustee's 'ability' (Mayer, Davis, and Schoorman, 1995; Sitkin and Roth, 1993), 'capability' (Jaatun, Pearson, Gittler, Leenes, and Niezen, 2020), 'expertise' (Parmigiani and Mitchell, 2005), or 'competence' (David and McDaniel, 2004) on the one hand, and 'willingness' (Jaatun *et al.*, 2020) on the other. Although with slight differences to the original works, in this study the first four of the above terms can be considered as synonyms, and from here on in the term 'ability' will be used. Furthermore, if we consider the ability to be domain-specific (Sitkin and Roth, 1993), we could reason that so is the trust (Zand, 1972). The willingness has also been related to (avoiding) opportunistic behaviour (Rousseau *et al.*, 1998), which is likely a more general personality trait (not as much domain-specific as the ability).

Although the digital vaccination certificate platform falls into the broader health sector, which *per se* encompasses high requirements for trust, here it is discussed mainly from the perspective of managing personal data. As the impeachment of trust in the case of this platform is not as fatal as could potentially be in the case of some other health-related technologies, the concern about trust is perhaps more related to personal data protection in general. In the increasingly digitalised world, where the concern over privacy can be felt with every new ICT application, the concern related to the processing of personal data is a serious trust barrier in the diffusion of innovations.

This is exactly where the value of the technical architecture of the DLTs comes to the picture – providing transparent, irreversible and encrypted data transmission technology and standardised contracts, which are not dependant on cultural context. The ability to provide this universal value constitutes the technical part of its trust advantage (competitive advantage resulting from being trustworthy).

Already today the vaccination clinics that fill in the yellow paper-based certificates need to be accredited, and often this information is also stored digitally in a national health system. Hence, it could be said that the individuals who are using it have at least some trust towards their own government's ability to handle this. In the case of the digital vaccination certificate platform, it will be leveraged with the need to trust personal data processing, storage and transfer across borders and cultures. We need to be aware that the technological awareness and acceptance of digitalisation is not equally high everywhere, and it differs also between cohorts in a country. Yet, for maximising the value this innovation can create, it is crucial to get the majority of the countries and their accredited clinics aboard.

As emphasised earlier, the success of a platform business model depends on its ability to create network effects. This ability, as argued below, further depends on the ability of the platform and its leader to create trust. The experience from commercial platform business models suggests that incumbents can leverage their existing reputation to jump-start their platform (Fuentelsaz, Garrido, and Maicas, 2015; Eisenmann *et al.*, 2011). Similarly, Estonia's reputation as a small agile country with a pro-innovation mindset was a good starting point for initiating this project. This kind of 'trustworthiness' advantage can hardly be copied by a single firm, especially a newcomer.

In many sectors, the requirement for trustworthiness is much lower for complementors, when compared to the platform leader. However, in this case it is not, as everyone wants to be sure that they get the right vaccine, in the right dosage, that it has been kept in proper conditions prior to the injection, etc. This can be achieved by accrediting the clinics and their doctors (the complementors), and it is done by a government authority.

The trust towards a nascent platform can also be increased by the careful inclusion of external partners and strategic allies. The selection of partners is an important strategic decision (Zott, Amit, and Massa, 2011), and their role is usually connected to scaling the platform for faster emergence of network effects. This role can be dedicated to them due to the possession of some specific technical capabilities, infrastructure, etc., or also coming from intangible assets, e.g. previous experience, reputation, including earned trust. In the case of the digital vaccination certificate platform, the impact of the WHO as

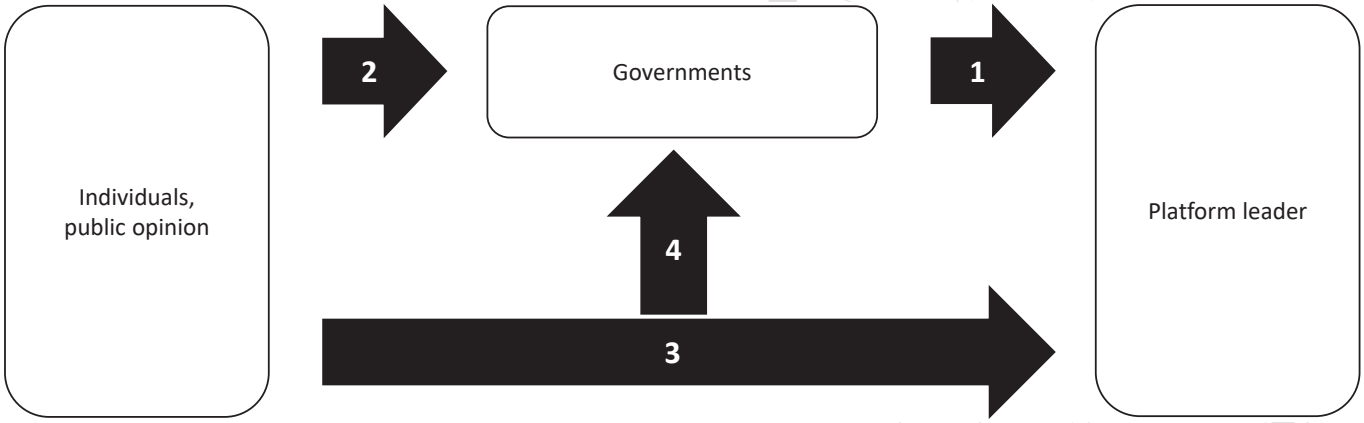

Figure 3: The path for forming trust towards a nascent vaccination certificate platform

a strategic partner[6] cannot be overemphasised. The value certainly comes from the WHO's international network, its information dissemination channels, etc., but likely most importantly from having the global and cross-cultural reputation of being trustworthy.

Formation of Trust in the Case of The Digital Vaccination Certificate Platform

A path for forming trust might not be straightforward for a nascent platform. In this particular case, the opportunity-risk ratio is first evaluated by the governments (arrow 1 in Figure 3), and if a government has decided to join the platform, only thereafter can it be used by individuals (arrow 2). As a feedback loop, the governments usually consider public opinion in making their decisions (arrow 4), and the public opinion about the new solution includes the perceived risk. This perceived risk in the public opinion depends also on whether the individuals trust the platform leader (arrow 3), first that their data will always be available when needed, and second, that it will not be misused. The latter is likely the biggest hurdle for large technology companies to become leaders of such platforms, as the cases of personal data misuse are vividly in people's memory.

In some cultural contexts, the individual's trust can also form through government in that if people have high trust in their own government, then they believe that the government makes good choices on their behalf. They do not feel the need to dive into technical details by themselves, and in a way this discharges individuals from direct liability in the case any of the risks are realised. One way or another, once the triangulation for this decision has reached a positive conclusion, it will be quite hard to turn it back, i.e. in a way they become dependent on it.

In parallel, the platform leader needs to trust the governments, who need to trust the vaccination clinics and personnel in their country. For the latter, the governments have set up registries, standards, and accreditation systems that are effective also today with the paper-based system. As also today, the governments need to trust that all other governments have done the same (i.e. intergovernmental trust). In this case, the trust is connected to validation of the actual vaccination procedure and its matching entry in the national database. If this is in place in all participating countries, and the other governments trust the platform leader and technology developer, then they can trust the whole platform as well. The case of the digital vaccination certificate platform is distinctive, in that the platform leader's role has been shared among the technology developers and the government of the developing and piloting country, i.e. this government has a dual role in the ecosystem.

[6] On October 5th, 2020, the Estonian government signed a Memorandum of Understanding (MoU) with the WHO [https://news.err.ee/1143517/estonia-and-world-health-organization-digitally-sign-cooperation-agreement]

The Nexus of Risk and Trust in a Platform Business Model, and its Effect on The Emergence of Network Effects

In explaining the nexus of risk and trust, scholars have used various terms, which allow us to also explain the risk in the context of a platform business model. These include, for example, the "perceived probabilities" (Bhattacharya, Devinney, and Pillutla, 1998) about failing or succeeding, or lack of "confidence" (Das and Teng, 1998) that the platform can deliver what it promises. Higher trust means that the perceived likelihood of positive outcomes is higher than of the negative outcomes (Figure 4), or that the potential benefits outweigh the risks.

In the case of the digital vaccination certificate platform, the perceived probability of succeeding to provide expected value to all ecosystem members is directly related to the perceived ability to create network effects (McIntyre and Srinivasan, 2017). However, as discussed before, the ability to create network effects depends on the platform leader's ability to form a strong platform ecosystem (including complementors and external partners) and manage (orchestrate) its operations.

The economics behind the platform's value creation is grounded in marginal utility theory, known from the neoclassical roots of microeconomics (see the works of Jevons, Menger, and Walras in the 19th century). For the platform to take off, the direct network effect coming from maximising the participating countries is most important. This would further result in maximising complying border-crossing points and accredited vaccination clinics. At the same time, the number of individual travellers using digital vaccination certificates would be maximised. However, for the platform to become sustainable and competitive in the long term, the indirect network effect that should come from a variety of complements and complementors is equally important (McIntyre and Srinivasan, 2017). If we assume that the first core service would be based on the Covid-19 vaccination, then access to certain public places (i.e. beyond border crossing) could be considered the first complement, as would be the vaccinations for other diseases. Furthermore, the ICT firms providing other e-governance solutions based on the same platform, using the same standard for interoperability, could become complementors as well. Hence, the indirect effect resonates with the possibility to extend the platform, to use it for many more health-related data and functions, and possibly beyond the

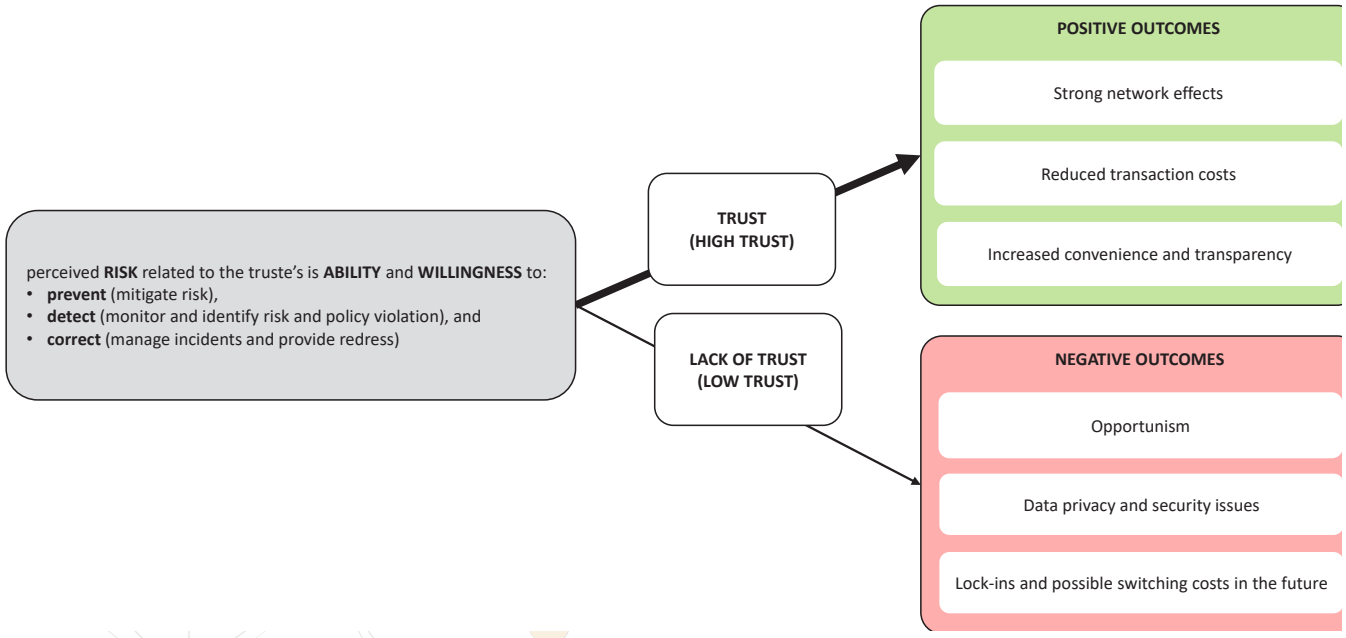

Figure 4: The nexus of risk and trust

health sector as a global e-governance standard. Ideally, both the direct and indirect network effects would emerge quickly and be strong in nature.

An increasingly important source of indirect network effect is also the data itself that accumulates during the platform operations and can provide valuable learning opportunities over time. The gathered data can be used to further improve the platform technology and offered service, and access to the data can be alluring to even more complementors, further strengthening the network effects. However, if this value creation mechanism that is very common in commercial platforms starts to threaten the formation of trust, then in this particular case this optional functionality should be dismissed.

These network effects do not emerge just by themselves. As usual with the platform business models, the initiator and platform leader need to solve the common 'chicken and egg' problem. Therefore, at the launch of a platform, the incentives are set to speed up the process, which is often achieved by subsidising (at least) one of the platform ecosystem members (Rochet and Tirole, 2006; Parker and Van Alstyne, 2005). This is needed until the platform reaches a critical mass of users, and the network effects become self-enforcing. Thereafter, when strong network effects have emerged, the platform can be quickly scaled up, and a sustainable incentives system is established. In the case of the digital vaccination certificate platform, similar effects can be achieved when countries with a common interest collaborate (e.g. the decision of the European Commission on 17.03.2021[7]).

The lack of trust (or low trust) may mean, in the worst case, that no agreement on collaboration will be achieved. But it may also be that because of urgent and severe needs the platform ecosystem will be formed, but the constantly emerging privacy and security issues do not allow it to achieve its full potential. Among the outcomes of joining a platform are also lock-in situations, which at first sight are positive from the platform orchestrator's view, but seem negative from a country's perspective. These may include, for example, technical lock-in, non-technical lock-in (e.g. habits), and possible switching costs. However, when looking deeper into the multi-sided platform business model value creation logic, it becomes apparent that all platform participants together benefit when everybody is locked in – the network effects are sustained.

The Different Facets of Trust, and their Dynamics

Across the disciplines, it can be observed that the (transaction cost) economists view trust as a cause of reduced opportunism among transacting parties, which results in lower transaction costs (Williamson, 1975), whereas organisational science suggests that the trust enables cooperative behaviour (Gambetta, 1988) and promotes adaptive organisational forms, such as network relations (Miles and Snow, 1992). Game theorists suggest that over time cooperative behaviour develops trust (Axelrod, 1984), i.e. emphasising its relative and dynamic nature, and bringing in the importance of the context when investigating the true functioning of trust (Rousseau *et al.*, 1998). Indeed, trust can be viewed in several contextual boundaries – economic, technological, cultural, etc. Moreover, the trust depends on the stakes involved, the balance of power in the relationship, and the alternatives available to the trustor (Mayer *et al.*, 1995). The interorganisational and interpersonal trust are different (Zaheer *et al.*, 1998; Fulmer and Gelfand, 2012), and this raises many challenges for building trust around a digital service like the platform-based certification of vaccinations.

From the rich extant literature stream, it is known that the phenomenon of trust can have many facets and levels (Fulmer and Gelfand, 2012). The trust can differ in the bandwidth (Sitkin and Roth, 1993; Rousseau *et al.*, 1998), where a narrow bandwidth refers to a specific trustee's ability, while a broad bandwidth may cover trust towards the trustee's general execution ability across disciplines or functions. It is possible (and likely) that across disciplines the trust is

[7] European Commission, COVID-19: Digital green certificates. [https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/safe-covid-19-vaccines-europeans/covid-19-digital-green-certificates_en]

not consistent (Lewicki, McAllister, and Bies, 1998). Rousseau *et al.* (1998) highlight the three basic forms of trust – calculus-based or calculative, relational, and institutional trust. These forms are present in all relationships, but their importance and role change over time. Deterrence is not usually considered as a form of trust, however, it certainly affects diffusion processes, and is sometimes mixed up with the utilitarian considerations of calculative trust. In the case of the digital vaccination certificate platform, the deterrence is backed by the underlying DLT. The main forms of trust and the sources of their formulation in the case of the digital vaccination certificate platform are shown in Figure 5.

The case where the trustor and the trustee are both individuals was evolutionally likely the first one. In this case, interpersonal trust matters first-hand through its institutionalising effects on interorganisational trust (Zaheer *et al.*, 1998), as individuals are viewed as representatives of their organisations or nations. Once the interpersonal trust has been achieved and well maintained, the start of any new collaborative project between these individuals (but also their organisations) can benefit from trust credit.

The relational trust emerges from previous experiences of cooperation. As this form of trust also depends on the cultural context, it has varying importance across the world (Dyer and Chu, 2003). It requires time and consistency, and therefore it is difficult to imitate and substitute (Barney, 1991) by competitors, and provides a potential source of sustained competitive advantage (Porter and Siggelkow, 2008). In the case of the vaccination certificate, the relational trust can build on the leading firms' and countries' previous track record in developing and managing reliable e-governance solutions, which by now have also been adopted by several other countries.

Calculative trust is based on rational choice. The quality of the choice further depends on the availability of comprehensive and truthful information,

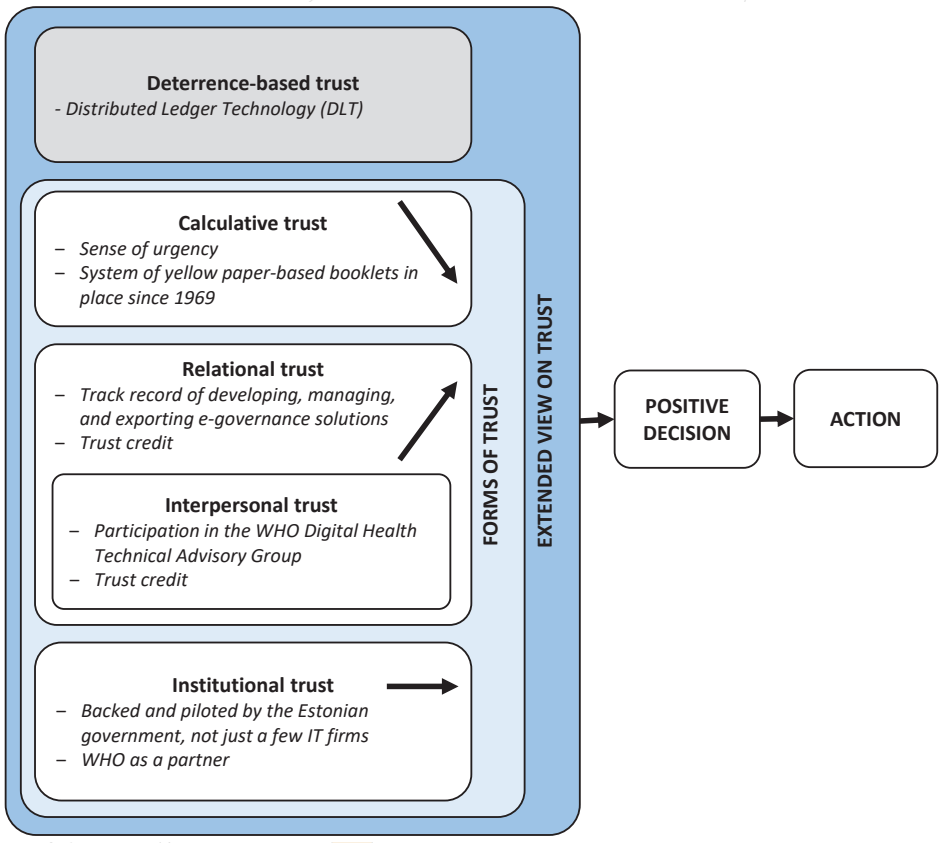

Figure 5: The forms and sources of formulation of trust

which is rarely the case in practice. Even if it were, it has been shown in behavioural economics (e.g. Ariely, 2008) that it would not necessarily be sufficient to predict the decisions and actions. It could be assumed that in the increasingly digitalised world one day the yellow paper booklets would have been replaced anyway because of their inherent inefficiency. But in the case of the vaccination certificate, one of the accelerators is clearly the sense of urgency created by the Covid-19 pandemic, and this feeds directly to the context where the rational choice is made. Although difficult to quantify precisely, it is clear that every day of delay with the decision and action will have a cost on the economy and society at large. The decision needs to be made promptly, and the partners who have a track record proving their ability to execute urgently will have an advantage. In economic transactions, the choice comes down to costs and benefits, and those who can provide a successful pilot or at least a working prototype *pro bono* could get an initial advantage. If wisely managed, this initial advantage can be developed into a sustainable competitive advantage.

The institutional trust can be built on the trust credit of the countries participating in the pilot project if these countries have experience in launching nationwide digital solutions. Despite the actual developers being ICT firms, the governments' role in promoting and sponsoring the initiative during the platform birth phase is crucial. Similarly, the role of the WHO as a strategic partner should not be undervalued, not only because it is a global non-governmental organisation, and therefore reduces the risk of opportunistic behaviour, but primarily because the WHO itself would be directly affected by 'cannibalism'. The WHO can affect the speed of change from both sides – how quickly the digital vaccination certificate platform is adopted, as well as how quickly the old paper-based yellow booklet phases out (is cannibalised).

It has been suggested that during the trust formulation process the share of calculative trust decreases and the share of relational trust increases, and that the role of institutional trust changes little throughout the trust development (Rousseau *et al.*, 1998). This change comes over time from accumulating collaboration experience. In their reasoning, building the trust starts from a blank page, i.e. they do not take into account the possibility to use trust credit.

In the case of the vaccination certificate, during the platform birth phase, trust credit can be a valuable resource for having a head start over the competition. The involvement of governments and ICT firms, which have a track record in e-governance solutions, confirms the domain-specific capabilities and expertise. These domain-specific capabilities do not cover only the technology, but also capabilities of orchestrating the whole ecosystem, including effectively managing any incurring challenges, and designing a business model that is financially sustainable, providing value to all platform sides. The strategic partnerships (e.g. the WHO) provide further trust credit about the achievability of global diffusion. It is reasonable to assume that as long the platform management (orchestration) structure remains stable, the institutional trust does not change much as well.

In the later phases, the initial trust credit needs to be justified. It will be gradually replaced by a rational calculative analysis of competing value propositions (including the switching costs, envisioned reduction of future transaction costs, etc.). The yellow paper booklets will be the first-hand reference for this analysis, but there will also be competition between the many digital newcomers around the world.

The relational trust changes throughout the platform development as well. At the birth, it is based on the ecosystem members' previous experiences with each other, or at least with the platform leader. When new experiences accumulate, e.g. during the piloting phase, the basis for trust becomes even more domain-specific, i.e. specific to this particular platform. The increase of the relational trust over time enables the platform to enter the self-renewal stage.

If a vaccination certificate platform succeeds in achieving leadership, then new questions related to the platform openness, possible new complements, and new areas of application will rise. The openness, which in the platform economy is predominantly seen as a positive feature, should not compromise

the existing platform members' trust towards the leader and the whole ecosystem.

As for the majority in the society, building trust takes time, while the social influence from the pioneer users is also an important part of the trust emergence (Rogers, 2003). The pioneers in this case are the first countries joining the pilot project, but at the same time also the first organisations or individuals (opinion leaders creating interpersonal trust). These pioneer countries are more likely the ones who recognise the existence of this kind of trust credit, or the ones who feel the most severe sense of urgency to have this kind of interoperable data platform in place.

Conclusions: The Role of Trust and Trust advantage in Gaining Sustained Competitive Advantage

The rise of the platform economy has brought to the spotlight competition between digital platforms, more recently also in the health sector. The trust-intensive nature of health data is likely the reason why the multisided platforms have not been diffusing in the healthcare systems as quickly as in other sectors, but it is about to change. As an antecedent of long-term cooperation (McEvily *et al.*, 2003), competitive advantage resulting from being trustworthy – the trust advantage – deserves further attention in analysing its potential diffusion paths.

The logic behind the platform business models challenges our understanding of the competition-cooperation nexus, prioritising between quality and quantity, as well as achieving and sustaining competitive advantage. In the platform economy, in the case of the first entrants to a market, a superior platform quality might be a way to outweigh a smaller ecosystem and weaker network effects (McIntyre and Srinivasan, 2017), as a high-quality platform can later be scaled up, not *vice versa*. The "quality" here is a combination of the platform leader's ability and willingness to orchestrate the platform setup and operations so that it would maximise mutually created value, and trust can also be considered a reflection of the abovementioned platform quality.

Trust is an intangible asset that has been often neglected or included in the broader term of a firm's reputation. Trust is likely one of the imperfectly imitable (Lippman and Rumelt, 1982) resources, in that a firm that does not possess it cannot obtain it (easily and quickly). The trust advantage is a socially complex (Wilkins, 1989) firm resource, which is extremely hard to copy, i.e. if the platform leader itself does not slip, then it can be a cornerstone of the sustained competitive advantage. Taken together, trust as a resource and the capability to gain and sustain trust, form the core of the competitive advantage for the platforms.

This article used the digital vaccination certificate platform as an example of a nascent platform, while announcements of several similar initiatives have been made around the world. Based on the rationale of a free market economy, the best price/value ratio from the end user's perspective emerges in a competitive market situation, while for the society as a whole the competition is perceived as a positive force. However, for simplifying global travel it would be logical that eventually one dominant standard would emerge. So, does this digital vaccination certificate platform offer a service where we can see (or would like to see) ongoing competition in the future, or is its perfect implementation possible only when there is one common global standard? Could the monopolistic status be a threat or would it be beneficial to the society as a whole?

First, it depends on how much, if any, power it has over the ecosystem members' national vaccination registries, or whether it is just an intergovernmental data communication platform. The yellow cardboard vaccination certificates have a common standard also today, but it is hard to see a business opportunity in it, rather they are a public good. However, if we look at the digital vaccination platform as a new data governance standard for e-health, or e-governance more broadly – as an attractive marketplace for providers of complementary goods and services, or as a hybrid platform encompassing also co-creation (Cusumano, Gawer, and Yoffie, 2019), the competition question becomes more relevant.

If a group of motivated participants in a business sector, covering the main ecosystem functions, already

successfully launches a DLT-based multisided platform that is able to provide increasing marginal utility through network effects, it will be very difficult to beat it with a traditional business model. The nature of network effects, which were discussed before, allows only a few dominant marketplaces (Gassmann, Schmück, and Gilgen, 2019), and the initial competitive advantage in this case could come from a first-mover advantage (Liebermann and Montgomery, 1988), assuming that the first-mover could get a lead with creating the network effects. The more countries that join the first platform, the higher the entry barriers (Bain, 1956) to followers will be, as it becomes harder to provide equal value compared to the first-comer, and hence harder also to attract a critical mass of users.

The trust develops over time, and its nature and influence mechanisms change. At the launch, the trust towards the digital vaccination certificate platform depends on the visionary countries, ICT firms and the individuals representing them. The objects of trust are the previous domain-specific experiences and references, which enable the trust credit. Another potential source of trust credit is the carefully chosen strategic partnerships, the WHO in this particular case.

Successful piloting further strengthens the trust, and it is crucial for creating stronger network effects and scaling up. Thereon, in the stabilisation stage, established trust motivates the countries and individuals to remain using the platform, and even apply it beyond international travel. The process is also well aligned with the ecosystem development model phases (birth, expansion, leadership, self-renewal) of Moore (1993), and it is useful in explaining how the trust evolves, and over time changes in its scope and degree.

In the course of the scaling up of the platform, the bottom line of the potential gains and losses becomes the focal point, i.e. the calculative trust in the platform's viability becomes central. In the stabilisation stage, the trust becomes dependent on the experiences in participating in the platform operations (e.g. success of the piloting period), and the platform leader's capability to orchestrate it – preventing, detecting and correcting faults, if necessary.

The global spread of Covid-19 has given the opportunity to harness the momentum of setting up a digital vaccination certificate platform, but it remains relevant far beyond Covid-19 – for travelling to countries where diseases like hepatitis, yellow fever, tuberculosis, rabies, etc. can still be found.

References

Aagaard, A. & Nielsen, C. (2021), The Fifth Stage of Business Model Research: The Role of Business Models in Times of Uncertainty, *Journal of Business Models*, Vol. 9, No. 1, pp. 77–90.

Amit, R. & Zott, C. (2015), Crafting Business Architecture: The Antecedents of Business Model Design, *Strategic Entrepreneurship Journal*, Vol. 9, No. 4, pp. 331–350.

Ariely, D. (2008), *Predictably Irrational: The Hidden Forces that Shape Our Decisions*, Harper Collins, Canada, 304 pp.

Axelrod, R. (1984), *The evolution of cooperation*, New York: Basic Books, 241 pp.

Bain, J. (1956), *Barriers to new competition*. Cambridge: Harvard University Press.

Barney, J. (1991), Firm Resources and Sustained Competitive Advantage, *Journal of Management*, Vol. 17, No. 1, pp. 99–120.

Bhattacharya, R., Devinney, T. M. & Pillutla, M. M. (1998), A Formal Model of Trust Based on Outcomes, *The Academy of Management Review*, Vol. 23, No. 3, pp. 459–472.

Casadesus-Masanell, R. & Zhu, F. (2013), Business model innovation and competitive imitation: The case of sponsor-based business models, *Strategic Management Journal*, Vol. 34, No. 4, pp. 464–482.

Cusumano, M. A., Gawer, A. & Yoffie, D. B. (2019), *The Business of Platforms: Strategy in the Age of Digital Competition, Innovation, and Power*. Harper Business.

Das, T. K. & Teng, B-S. (1998), Between Trust and Control: Developing Confidence in Partner Cooperation in Alliances, *The Academy of Management Review*, Vol. 23, No. 3, pp. 491–512.

David, L. P. & McDaniel, R. R. Jr. (2004), A Field Study of the Effect of Interpersonal Trust on Virtual Collaborative Relationship Performance, *MIS Quarterly*, Vol. 28, No. 2, pp. 183–227.

de Reuver, M., Sørensen, C. & Basole, R. C. (2018), The digital platform: a research agenda. *Journal of Information Technology*, Vol. 33, pp. 124-135.

Dyer, J. H. & Chu, W. (2003), The Role of Trustworthiness in Reducing Transaction Costs and Improving Performance: Empirical Evidence from the United States, Japan, and Korea, *Organization Science*, Vol. 14, No. 1, pp. 57–68.

Eisenmann, T., Parker, G. & Van Alstyne, M. (2009), Opening platforms: how, when and why? In *Platforms, Markets and Innovation*. Gawer A (ed). Edward Elgar: Cheltenham, UK.

Eisenmann, T., Parker, G. & Van Alstyne, M. (2011), Platform envelopment, *Strategic Management Journal*, Vol. 32, pp. 1270–1285.

Fuentelsaz, L., Garrido, E. & Maicas, J. P. (2015), A Strategic Approach to Network Value in Network Industries, *Journal of Management*, Vol. 41, No. 3, pp. 864–892.

Fulmer, C. A. & Gelfand, M. J. (2012), At What Level (and in Whom) We Trust: Trust Across Multiple Organizational Levels, *Journal of Management*, Vol. 38, No. 4, pp. 1167–1230.

Gambetta, D. (1988), *Trust: Making and breaking cooperative relations*. New York: Basil Blackwell.

Gassmann, O., Schmück, K. & Gilgen, N. (2019), Democratizing the Platform Economy: The Quiet Revolution Through Blockchain. [https://coinjournal.net/news/democratizing-the-platform-economy-the-quiet-revolution-through-blockchain/]

Gawer, A. & Cusumano, M. A. (2008), How Companies Become Platform Leaders, *MIT Sloan Management Review*, Vol. 49, No. 2, pp. 28–35.

Jaatun, M. G., Pearson, S., Gittler., F., Leenes, R. & Niezen, M. (2020), Enhancing accountability in the cloud, *International Journal of Information Management*, Vol. 53, 101498.

Lewicki, R. J., McAllister, D. J. & Bies, R. J. (1998), Trust and distrust: New relationships and realities, *Academy of Management Review*, Vol. 23, No. 3, pp. 438–458.

Lieberman, M. B. & Montgomery, D. B. (1988), First-Mover Advantages, Strategic Management Journal, Vol. 9, No. S1, pp. 41–58.

Lippman, S. A. & Rumelt, R. P. (1982), Uncertain imitability: An analysis of interfirm differences in efficiency under competition, *Bell Journal of Economics*, Vol. 13, pp. 418–438.

Massa, L., Tucci, C. L. & Afuah, A. (2017), A Critical Assessment of Business Model Research, *Academy of Management Annals*, Vol. 11, No. 1, pp. 73–104.

Massa, L., Viscusi, G., & Tucci, C. (2018), Business Models and Complexity, *Journal of Business Models*, Vol. 6, No. 1, pp. 70–82.

Mayer, R. C., Davis, J. H. & Schoorman, D. (1995), An integrative model of organizational trust, *Academy of Management Review*, Vol. 20, No. 3, pp. 709–734.

McEvily, B., Perrone, V. & Zaheer, A. (2003). Introduction to the Special Issue on Trust in an Organizational Context, *Organization Science*, Vol. 14, No. 1, pp. 1–4.

McIntyre, D. P. & Srinivasan, A. (2017), Networks, platforms, and Strategy: Emerging views and next steps, *Strategic Management Journal*, Vol. 38, No. 1, pp. 141–160.

Miles, R. E. & Snow, C.C. (1992), Causes of failure in network organizations, *California Management Review*, Vol. 34, No. 4, pp. 93–72.

Miller, G. J. (1992), *Managerial dilemmas: The political economy of hierarchy*. New York: Cambridge University Press.

Moore, J. F. (1993), Predators and prey: a new ecology of competition, *Harvard Business Review*, Vol. 71, No. 3, pp. 75–83.

Parker, G. G. & Van Alstyne, M. (2005), Two-sided network effects: A theory of information product design, *Management Science*, Vol. 51, No. 10, pp. 1494–1504.

Parker, G. G. & Van Alstyne, M. W. (2018), Innovation, Openness, and Platform Control, *Management Science*, Vol. 64, No. 7, pp. 3015–3032.

Parmigiani, A. & Mitchell, W. (2005), How buyers shape supplier performance: Can governance skills substitute for technical expertise in managing out-sourcing relationships?, *Academy of Management Proceedings*, C1–C6.

Porter, M. E. & Siggelkow, N. (2008), Contextuality within activity systems and sustainability of competitive advantage, *Academy of Management Perspectives*, Vol. 22, No. 2, pp. 34–56.

Rochet, J-C. & Tirole, J. (2006), Two sided markets: a progress report, *The RAND Journal of Economics*, Vol. 37, No. 3, pp. 645–667.

Rogers, E. M. (2003), *Diffusion of Innovations*. Fifth Ed., New York: Free Press. 576 p.

Rousseau, D. M., Sitkin, S. B., Burt, R. S. & Camerer, C. (1998), Not so different at all: A cross-discipline view of trust, *Academy of Management Review*, Vol. 23, No. 3, pp. 393–404.

Schmeiss, J., Hoelzle, K. & Tech, R. P. G. (2019), Designing Governance Mechanisms in Platform Ecosystems: Addressing the Paradox of Openness through Blockchain Technology, *California Management Review*, Vol. 62, No. 1, pp. 121–142.

Sitkin, S. B. & Roth, N. L. (1993), Explaining the limited effectiveness of legalistic "remedies" for trust/distrust, *Organization Science*, Vol. 4, pp. 367–392.

Strauss, A. & Corbin, J. (1994), Grounded Theory Methodology: An Overview. In Denzin, N., Lincoln, Y. Handbook of Qualitative Research. 1st Ed., pp. 273–284.

Teece, D. (2017), Dynamic Capabilities and (Digital) Platform Lifecycles, *Advances in Strategic Management*, Vol. 37, pp. 211–225.

Trischler, M., Meier, P., & Trabucchi, D. (2021), Digital Platform Tactics: How to Implement Platform Strategy Over Time, *Journal of Business Models*, Vol. 9, No. 1, pp. 67–76.

Wareham, J., Fox, P. & Giner, J. C. (2014), Technology Ecosystem Governance, *Organization Science*, Vol. 25, No. 4, pp. 1195–1215.

Werbach, K. (2018), *The Blockchain and the New Architecture of Trust*. Cambridge, MA: MIT Press.

Wilkins, A. (1989), *Developing Corporate Character*. San Francisco: Jossey-Bass.

Williamson, O. E. (1975), *Markets and hierarchies*. New York: Free Press.

Zaheer, A., McEvily, B. & Perrone, V. (1998), Does Trust Matter? Exploring the Effects of Interorganizational and Interpersonal Trust on Performance, *Organization Science*, Vol. 9, No. 2, pp. 141–159.

Zand, D. E. (1972), Trust and managerial problem solving, *Administrative Science Quarterly*, Vol. 17, pp. 229–239.

Zott, C., Amit, R. & Massa, L. (2011), The Business Model: Recent Developments and Future Research, *Journal of Management*, Vol. 37, No. 4, pp. 1019–1042.

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