Insights into understanding the perspective of digital platform providers

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Abstract. *Organizational transformation is an integral part of implementing, joining, or adopting digital platforms in platform-based ecosystems. Insights into the perspective of digital platform providers presented in this paper aim to contribute to understanding the digital platform providers' intention to implement their solution for supporting platform-based business models and operations. This research is motivated by the scarce existing literature on this matter and based on the application of qualitative data-extraction and assessment methods for identifying concepts that define the role of DP providers. Ten factors describing providers perspective were identified and which are related to previous factors describing other stakeholders' intentions as well. By evaluating their capabilities across the conceptual model presented in this paper, providers can assess their readiness to implement DP and thereby evaluate perceived values and risks impacting their intention to implement a DP.*

Keywords. Digital platform, provider, conceptual model

1 Introduction

The increasing use of digital technologies in recent years has led to the evolution and development of the digital ecosystem concept. The platform for their gathering is digital. Digital ecosystems vary in how dominant some partners, products and services are, in the openness, flexibility and adaptability of the structure and process to changes in the environment, in the space in which they operate in scalability and sustainability and other factors. The objectives of digital ecosystems are synergy through partnership, integration of business processes and supply chains, etc., with the aim of creating a shared value of the digital ecosystem. Cooperation within the digital ecosystem and the design of appropriate business models is the result of the dynamic capabilities of organizations (Helfat & Raubitschek, 2018) whose connectivity is based on digital infrastructure, most often digital platforms (DPs). The complexity of digital platforms is seen in their intertwining with different institutions, markets and technologies (de Reuver et al., 2018). Their value has been identified in a number of industrial areas, as digital platforms emphasize strengthening cooperation (Hein et al., 2020) and open innovation (Bonollo & Poopuu, n.d.), facilitate information sharing (Sedera et al., 2016; Sutherland & Jarrahi, 2018) and focus on meeting the needs of different stakeholders within the digital ecosystem.

„*Digital platforms are often multi-sided, providing interfaces with and among two or more groups of economic actors on different 'sides' of the platform, including providers of complementary assets*" (Helfat & Raubitschek, 2018). Platforms design business and organizational models that focus on joint value creation (Karhu et al., 2018) for end users of products or services, stakeholders within the digital ecosystem, and platform owners. In doing so, platform owners enable other stakeholders to create products or services on the platform, which leads to the strengthening of the entire digital ecosystem and the creation of a diversified advantage for the ecosystem (Valdez-De-Leon, 2019). The platform architecture enables the centralization and integration of common features into core modules (Cenamor et al., 2019), thus facilitating the use of shared resources and the integration of knowledge from different fields. In this way, new features of business models were initiated that put information management and the network of relationships at the centre of the model.

Platforms differ on several key grounds: the interactions they allow, the speed of growth and development, the level of openness, competitive strategies, the way of problem solving, represented monetization methods and subsidies (Web Content Hunt Platform, 2018). Based on the analysis of more than 170 platform businesses with different characteristics, the authors identified the following types of platforms: Technology Platforms; Computing Platforms; Utility Platforms; Interaction Networks; Marketplaces; On-demand Service Platforms; Content Crowdsourcing Platforms; Data Harvesting Platforms; Content Distribution Platforms.

Platforms that provide building blocks or services for reuse by third-party developers with the goal of embedding them in their own products are called *Technology Platforms* (Web Content Hunt Platform, 2018). Such platforms are usually invisible to end users, are cashed in by selling services to developers, and are not based on the interaction between supply and demand (do not connect platform participants) (Web Content Hunt Platform, 2018). The mentioned characteristics are favourable to third parties (Cardoso, 2017), as they reduce the budget required for hardware procurement and data centre maintenance, which further leads to greater development agility (Kejariwal, 2013).

Computing Platforms are based on the interaction between third-party developers and users of the platform, where the platform "owns" users (Tran et al., 2017; Web Content Hunt Platform, 2018). These platforms can be expanded with new uses, generating more value for the platform based on the development of two-way network effects in which the following scenario is represented: users attract developers, developers create applications, applications attract users, users developers, etc.

Providing a free service is a basic feature of *Utility Platforms* (Web Content Hunt Platform, 2018), which, after identifying a critical mass of users, can be opened to other participants (Manur et al., 2018) such as advertisers and carriers.

Interaction Networks are designed to facilitate the interaction and communication of different participants in the platform (Web Content Hunt Platform, 2018), with users attracting other users, who further attract even more users, thus creating a network effect. Such one-sided platform enables the exchange of messages, photos, videos and other content for which a mass of users has gathered on the platform (Feezell & Ortiz, 2021).

Marketplaces platforms connect participants on the supply and demand side (Web Content Hunt Platform, 2018). Suppliers on the supply side offer their products, while customers appear on the demand side (Zervas et al., 2021), and the platforms allow them to make mutual (monetary) transactions.

Platforms that connect waiting time sensitive customers with independent service providers (Taylor, 2018) are called *On-demand Service Platforms.* These platforms combine functionalities such as discovery, ordering, payment, certification, etc., with the platform defining the price, the required quality standards, and the processes to meet them. For On-demand Service Platforms it is characteristic that customers have very little influence in defining the way the service will be delivered (Web Content Hunt Platform, 2018).

Collecting content (reviews, videos, etc.) from a subset of users and sharing it with a wider set of users (Linares-Bahillo et al., 2019), is the core functionality of *Content Crowdsourcing Platforms.* The more content the platform offers, the more users will join it (Web Content Hunt Platform, 2018), which will consequently affect its growth and popularity.

Platforms that generate their value based on collected data (Malandrino et al., 2018) are called *Data Harvesting Platforms*. The condition for joining the platforms is the generation of data by their users (Web Content Hunt Platform, 2018).

Content Distribution Platforms are the link between owners of user touch-points (web sites, mobile apps) and content owners who want to deliver content to interested users (Web Content Hunt Platform, 2018). Such platforms use functionalities such as content recommendation algorithms to deliver interesting and personalized content to content users (Xiao et al., 2021).

Extending functionalities through adding services based on business requirement blurs the distinctive primary type of classification of a digital platform. A typical example here fore are e-learning platforms, initially designed mostly as content distribution platforms. E-learning platforms have embraced other services among others, specific for network platforms like supporting social interaction between platforms participants. This widening of the pool of desired functionalities, was especially triggered by recent disruptive events, motivating more organizational and business transformation, and demonstrating the possibilities of digital transformation stronger than any other enabler prior investigated. Therefore, the evolution of DPs bears potentials yet to be discovered and harvested.

The paper is structured in 6 chapters. After introduction and defining basic concepts of the research, perception factors impacting producer's or customer's intention to join or adopt a DP are considered. The research methodology follows, after which it is shown extended conceptual model of factors impacting the decision to join, adopt, or implement a DP. Evaluation of perceived values and risks in assessing readiness to implement DP is the next chapter, and the paper ends by presenting research conclusions.

2 Perception factors impacting producer's or customer's intention to join or adopt a DP

Previous research (Kadoic et al., 2020, 2021; Tomicic-Pupek et al., 2020) was focused on identifying perception factors impacting producer's or customer's intention to join or adopt a DP. Perception in this context refers to a subjective assessment of the objective properties of an object of interest (Tomicic-Pupek et al., 2020). For each of these actors, i.e., customers and producers, 10 perception factors have been identified that determine the perception of customers and producers regarding the utility of a platform for the distribution of agricultural products.

The assumption is that these 10 factors impact perceived value or perceived risk gained through DP usage, regardless of the real value of these factors measured objectively.

Generalizing these factors, initially recognized by exploring utility of platforms for the distribution of agricultural products, opens research possibilities for investigating their appropriateness in a broader context of any DP. Also, it enables further investigation of other actor roles in platform-based ecosystems and analysing their perspectives regarding their intention to interact in such digital environments.

From the customer's perspective, the balance between perceived value and risk determines his/her intention of joining the platform in order to buy products, consume content, use services, interact in virtual communities or use other digital services offered as platform-provided functionalities. The generalized 10 customer factors are listed below with some examples of possible perception elements.

- Zero negative impact: Eco-friendliness, Zero waste, Low resource consumption;
- Delivery location & time: short delivery chains, delivery duration, reliability, delay management;
- Relationship history with the producer: existing experiences, response time and response quality, flexibility and commitment to build sustainable relations;
- Payment options: price, price volatility, payment currencies and security, hidden costs;
- Comfort & convenience: remote usefulness and enjoyment, suggestions based on forecasted behaviour, 24/7 availability;
- Recommendations (C2C2C): confidentiality of community reviews, social media-based platforms as a communication channel, vortex similar behaviour in recommendation availability;
- Community support: supporting sustainable and resilient local economy, community affiliation management, social responsibility;
- Producer's reliability: value for money, availability to quality ratio, cost saving; producer's social impact;
- Trust & traceability: ability to track all phases of product or service generation through the value chain including preparation, production process, harvesting, delivery, trust in social interactions;
- Product or Service safety: facing disruption challenges, experiencing perception of safety and "no harm has been done" activities through the value chain including preparation, production process, harvesting, delivery to product or service consumption;

From the producer's perspective a set of other factors determines the balance between perceived value and risk which impacts their intention to adopt platforms in order to sell products, distribute content, provide services or use other digital services offered as platform-provided functionalities for this type of actors. The generalized 10 producer factors are listed below with some examples of possible perception elements.

- Sales channels: customer-preferred sales channels and producer-preferred channels, omnichannel process alignment;
- Product or Service safety: dealing with disruption challenges, designing, creating and delivering positive perception of product or service safety and "no harm has been done" activities through the value chain including preparation, production process, harvesting, delivery to product or service consumption;
- Production or Service delivery technologies: efficient and effective production process with near zero negative impact supported by appropriate technologies, growing potential for new feasible value creation models;
- Product or Service Quality: assuring expected or behaviour- designed quality product or service through the value chain including preparation, production process, harvesting, delivery to product or service consumption;
- Resources: implementing digital technologies to empower, support or replace missing human labour, building corporate culture of continuous investment in new skills, knowledge and capacity, managing supply chain disruptions;
- Inbound logistics / Supply Chain: managing supply chain disruptions, assuring substitute raw materials, supply channels, vendors or technologies;
- Innovations: building innovation potentials, design and adoption of new value creation paradigms, setting or adjusting to new trends;
- Outbound logistics / Distribution chain: managing distribution chain disruptions; assuring substitute distribution channels, and delivery collaborating actors;
- Incentives and sustainability: building and supporting readiness to adopt new technologies, raising sustainability and resilience of business models, availability of initiatives for providing incentives;
- Regulatory compliance: dealing with uncertainty in meeting regulatory and legal frameworks; accountability in relation to customers and other stakeholders, best practice in managing risks and changing conditions in operating markets.

The generalized perception factors impact various perspectives on DP's business model because it encompasses various customer segments, value propositions and channels as well as value creation generation opportunities, efficient cost structures and revenue streams for producers. The digital business model must be supported by a DP, which has the potential of contributing to the organizational success. Therein is the importance of the DP provider's role: in the design, development, and implementation phases. Therefore, the presented generalized perception factors

should be considered when a provider decides on his intention to implement a digital platform.

3 Research method

Judging by the published scientific papers, digital platform providers have been the subject of scientific research for twenty years. A search of Web of Science (WoS) database can serve as an indicator of scientific production in this area. Search with the key term "platform provider" in the title, singled out 10 articles, an average of one paper since 2013. If abstracts are searched, the number of articles in WoS is 108. The aim of this study is gaining insight, synthesizing and consolidating knowledge from previous research in order to construct a set of factors that describe the role of digital platform providers. Therefore, a very focused literature review was conducted. Searching the Scopus database based on the combination of keyword "digital AND platform AND provider" in the document title resulted in a total of 12 articles, which were studied. Although this literature review cannot be seen as exhaustive, it is still indicative for understanding the initial role of DP providers: certain issues related to the potential of DP-supported value creation still exists, regardless of numerous papers tackling with different aspects of platform-based business, published in general. All papers were reviewed to summarize, compare and synthesize existing research topics and research gaps by applying qualitative data-extraction and assessment methods. By identifying and comparing various concepts defining the role of DP providers through concepts DP providers need to consider when implementing digital platforms.

4 Extended conceptual model of factors impacting the decision to join, adopt, or implement a digital platform

The literature gathered through a focused literature review was analysed respectively based on quality criteria for literature analysis were as follows: (1) Is the publication relevant to our research goal of understanding the role of digital platform providers? (2) Does the paper cover enough data on similar issues related to DP providers? (3) Which findings could be relevant for constructing a set of factors describing the role of digital platform providers? (4) Do the factors relate to existing producer or customer perception factors impacting their intention to join or adopt a DP? Three data sets were extracted: (a) Leading factor of provider's role impacting his intention to implement a digital platform, (b) Data extracted and coded from the literature supporting the relevance of the factor, (c) Relation to producer or customer perception factors. The data was finally compiled a table synthesizing the extracted information.

Table 1. Factors provider's role impacting his intention to implement a digital platform

Factors	Findings supporting the relevance of the factor	Relation to producer or customer perception factors
Resource dependencies & bottlenecks	• DPs are dependent on enabling technologies due to the possibility that technological and strategic bottlenecks impact access to DP's services (Ojala et al., 2018) • DPs contribute to organizational capability to harness potential of digital technologies (Saarikko, 2016) • Integration of supply chain participants of ecommerce together (Song et al., 2021) • Providing easy and convenient access to the multiple services through different devices (Ojala et al., 2020) • Importance of Dynamic Capabilities: Sensing (identifying and developing opportunities) & seizing (exploiting technological and market opportunities) by mobilizing organizational resources (Riefle et al., 2021; Teece, 2007)	*Producer:* Incentives and sustainability, Resources *Customer:* Comfort & convenience, Delivery location & time
Purpose and functionality dependencies	• DPs are dependent on the available content (Ojala et al., 2018) comments in the active content-based activity (Kim, 2018) • Providers apply tipping and coring approaches (Saarikko, 2016) • Marketplace-type of digital platforms rely strongly on marketplace promotions and recommendations aimed at attracting service providers and their integration (Vakeel et al., 2021)	*Producer:* Sales Channels, Resources *Customer:*

	• Balancing advantages and challenges of digital platform's engagement in digitalisation initiatives in retailing industry (Hardaker, 2022) • Importance of individual and group interaction (Anonymous, 2018) • DP's core open to extension of functionalities with modular services (Riefle et al., 2021) according to (Baldwin & Woodard, 2008; Tiwana et al., 2010) • Production/ Innovation/ Transaction logic-industry platforms (Saarikko, 2016) according to (Gawer, 2009)	Product or Service Quality, Comfort & convenience
Platform multi-layer architecture	• Multi-layered modular architecture: Frontend including (i) a content layer, (ii) a service layer, and backend including (iii) a network layer, and (iv) a device layer (Saarikko, 2016) and (Ojala et al., 2018) according to (Yoo et al., 2010) • Balancing front-end based business-related requirements and backend dependant technical possibilities (Saarikko, 2016) • Centralized and decentralized DPs (Kazan et al., 2014) • Modular-architecture processes (Song et al., 2021) • Bargaining options with stakeholders claiming their operator role (Hardaker, 2022) • Stable core with modular services (Riefle et al., 2021) according to (Baldwin & Woodard, 2008; Tiwana et al., 2010)	*Producer:* Resources, Innovations *Customer:* Product or Service Quality, Delivery location & time
Value creation options	• "Quest for new value-added services that could be converted into sustainable revenue streams or increased openness in innovation" (Kazan et al., 2014) • Value creation through selling targeted advertisements (Farshchian & Vilarinho, 2017) • Hybrid business ventures available offline and online (Ojala et al., 2020) • New sources of data for growth opportunities (Hardaker, 2022) • Adopting a service ecosystem perspective leading to integration of complementary services (Riefle et al., 2021) • Different DP actors are sharing value, enabling thereby DPs to evolve and grow (Anonymous, 2018)	*Producer:* Innovations, Production or Service delivery technologies *Customer:* Product or Service Quality, Producer's reliability
Co-provider relations across layers	• Centralized inclusive API and decentralized non-discriminatory API management in relation to third-party developers (Farshchian & Vilarinho, 2017; Kazan et al., 2014) • Customer loyalty to DP through consuming services from different vendors (Vakeel et al., 2021) • Big data about platform stakeholders and their behaviour (Hardaker, 2022) • Introducing innovations by complementary services or products (Wan et al., 2017) yet not all will benefit equally (Vakeel et al., 2021) • Social and relational capabilities are impacting the development of cooperation between trusted partners (Riefle et al., 2021)	*Producer:* Inbound logistics / Supply Chain, Outbound logistics / Distribution chain *Customer:* Zero negative impact, Payment options
Access control & limitations	• Prevention or limitation to DP resources which provider controls (Ojala et al., 2018) • Difference in managing access control & limitations at centralized and decentralized DPs (Kazan et al., 2014) • Policies regarding data sharing (Farshchian & Vilarinho, 2017) • Provider's data ownership as a leverage to favour some service providers over others (Vakeel et al., 2021) • Limitations (e.g. based on resource bottlenecks or legal regulations (Ojala et al., 2020)) impacting even access to markets (Anonymous, 2018)	*Producer:* Resources, Regulatory compliance *Customer:* Trust & traceability
Efforts through platform	• Theoretical concepts, activities, and empirical examples through different phases of DP lifecycle: Establishment, Entry, Commercialization, and Globalization (Ojala et al., 2018)	*Producer:*

evolution phases	• Technical bottlenecks are mostly appearing in the in the early entry phase (Ojala et al., 2018) • Users' activities and interaction on the platform are a critical element for DP's success (Anonymous, 2018; Kim, 2018), especially for the diffusion and activation the early stages (Anonymous, 2018) • Facilitating and managing uploaded contents and frequency of interactions (Kim, 2018) • Supporting internationalization phases of ventures: "Early internationalization of the digital service; Extension of digital service functionalities for global markets; Global Technology alignment" (Ojala et al., 2020) • In the globalization phase content providers, delivery channels, and users should be able to easily join and exit DP's service pool (Ojala et al., 2018)	Sales channels, Product or Service Quality *Customer:* Recommendations (C2C2C), Community support
Incentives for active interaction	• Collective actions and active interaction among trusted community members (Song et al., 2021) • Data about user relationships has more potential value than user contents (Kim, 2018) • DPs are providing availability of services at home and within communities (Farshchian & Vilarinho, 2017) • Digital platforms which are based on search and social media data can provide targeted access to specific groups of users (Vakeel et al., 2021) • Social relationships and establishing a social communities of users can be critical to platform success even more than content quality especially at the early phases (Anonymous, 2018; Wan et al., 2017)	*Producer:* Sales channels, Incentives and sustainability *Customer:* Recommendations (C2C2C), Community support
Behaviour modelling and experience design	• In the commercialization phase, finding feasible pairs of service-markets is of immense importance for building a sizable customer base covering service strategic bottlenecks (Ojala et al., 2018) • Network transaction frequency, (re)visit rate, uploading contents, and interaction activities over time describe customer behaviour and provide the base of future experience design (Kim, 2018; Vakeel et al., 2021) • Reprogrammable & editable services on DPs (re)designed to meet, trigger or engage existing or new designed customers' preferences and needs (Ojala et al., 2020)	*Producer:* Innovations, Product or Service Quality *Customer:* Recommendations (C2C2C), Relationship history with the producer, Comfort & convenience
Accountability, regulatory and legal compliance	• Criticism of avoidance of accountability, failing to address properly labour protections and other regulatory frameworks (Hardaker, 2022) • Agreement with fact that "some kind of regulation on digital platforms is necessary due to their dominant market position and tax avoidance" (Riefle et al., 2021) • Regulators are facing the challenge to coordinate regulatory and legal compliance issues (Wan et al., 2017)	*Producer:* Regulatory compliance *Customer:* Product or Service safety, Producer's reliability, Trust & traceability

Figure 1 visualizes the extension of previous research (Tomicic-Pupek et al., 2020) by presenting generalized customer and producer factors and the new dimension of identified DP provider factors that impact the provider's intention to implement a DP. Factors are influencing platform actors' perceived balance of value or risk based on their role: for DP provider's intention to implement a DP (coloured green), but also through generalized factors customer's intention to join and producer's intention to adopt the DP (grey and yellow coloured respectively).

The identified factors shown in the extended conceptual model can imply convergent or divergent relationships between various stakeholders, influencing thereby their perceived balance of value or risk and the overall decision on joining, adopting, or implementing a DP.

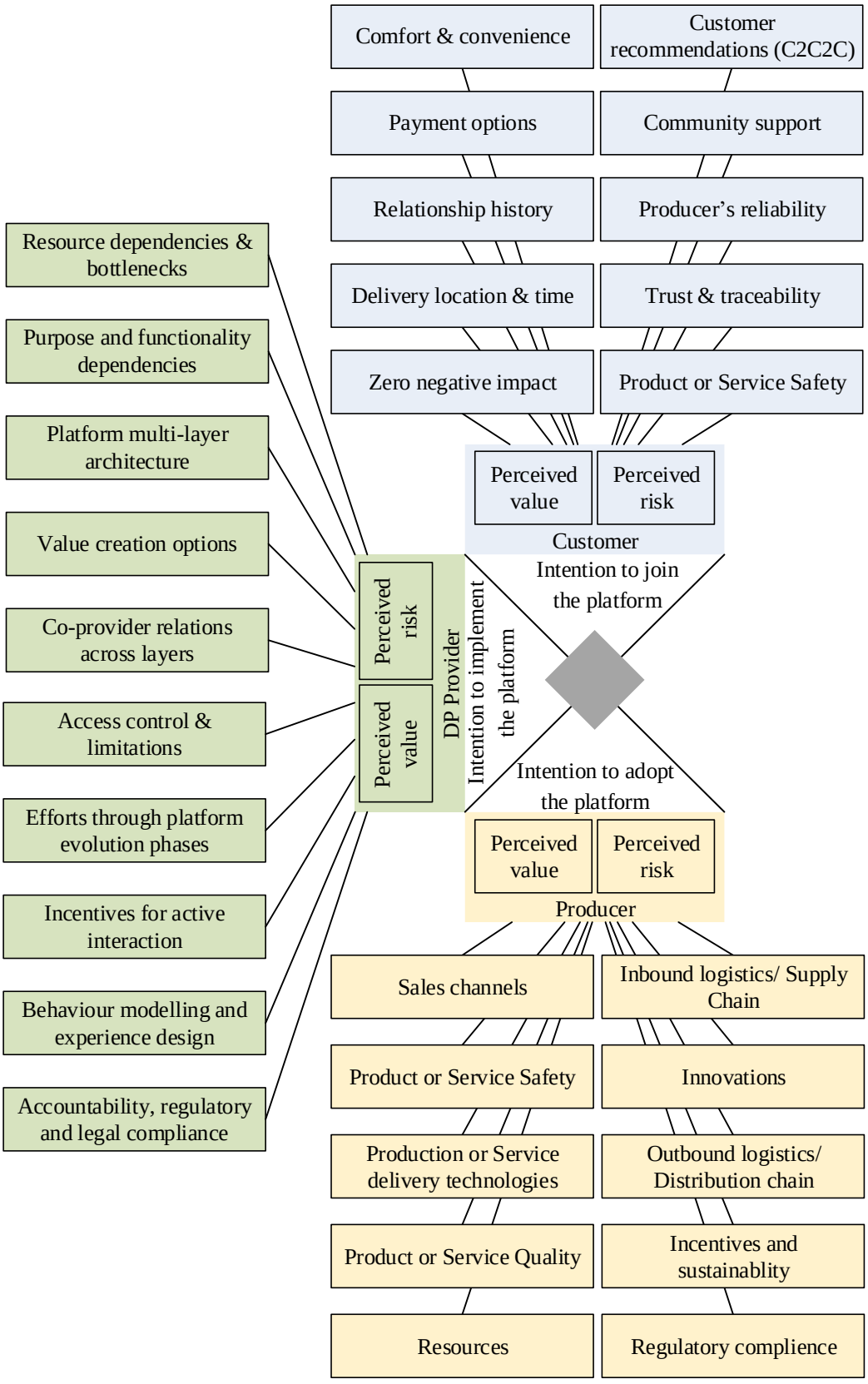

Figure 1. Extended conceptual model of factors impacting the decision to join, adopt, or implement a digital platform (extension to (Tomicic-Pupek et al., 2020))

5 Evaluation of perceived values and risks in assessing readiness to implement DP

As part of the feasibility assessment, it is desirable that potential platform providers assess their readiness to implement a DP. This assessment is based on revising their capabilities in relation to identified factors, and thereby evaluating perceived values and risks impacting their intention to implement DP:

- Technical, human, financial and other kind of resources at our disposal or do we have access to those resources for successful resolving dependencies and handling all kind of bottlenecks (Farshchian & Vilarinho, 2017; Ojala et al., 2018).
- Purpose and functionality which can be successfully replicated for global markets (Ojala et al., 2018) should provide "anticipated outcomes despite unanticipated circumstances" (Saarikko, 2016) contributing to product or service quality, as well as comfort & convenience experienced by customers.
- Designed or developed multi-layer architecture with different approaches in coupling platform layers to configure centralized (tightly coupling layers) or decentralized (decoupling layers) platforms (Kazan et al., 2014). Due to vendor-specific relations across various the multi-layered architecture technology-driven innovations pose a challenge (Farshchian & Vilarinho, 2017).
- Technical possibilities should enable replication of open modular platforms with high level of editability and reprograming based on functional requirements (Ojala et al., 2020) to ensure feasible value creation options for the DP provider.
- Co-provider relations across layers impacts the mutual agreement on what constitutes value creation opportunities (Saarikko, 2016) with possibly unequal potential for benefits (Vakeel et al., 2021).
- Appropriate access control and limitation management for different types of DPs (Kazan et al., 2014) may affect co-provider relations across layers (Vakeel et al., 2021) but also impact efforts during evolution phases on different markets (Riefle et al., 2021). Trust and traceability concerns at the customer side can be outvoted by incitive motivation to join a DP, yet minimum accountability, regulatory and legal compliance must be met.
- Efforts through platform evolution phases must not exceed potential revenue streams especially, for international new ventures (Ojala et al., 2018, 2020). Also, some organizations struggle with the transformation of an industrial corporation into a DP provider and seek support through different enablers of change (e.g., some authors suggest 7 enablers with actionable guidelines (Riefle et al., 2021)).
- Incentives for active interaction should be accessible for DP providers to boost social relations through the platform building thereby digital communities with strong user relationships, by some authors even argued to be "more important than user contents" (Kim, 2018).
- Platform use behaviour modelling and design of new experience opportunities can be crucial for adding new services at the service layer impacting thereby existing and future performance (Wan et al., 2017). Every step of the customer journey from customer engagement and onboarding to retention needs to be designed and developed for aiming DP's value creation propositions.
- Accountability, regulatory and legal compliance have an influence on the perceived product or service safety, producer's reliability, trust & traceability of other stakeholders. Failing to meet the requirements regarding these characteristics of a DP, raises issues for DP providers but also for regulators which contribute more to the perceived risks of implementing a platform on a global scale (Hardaker, 2022; Wan et al., 2017). Therefore, appropriate efforts in early phases of DP evolution phases must be performed regarding this factor.

6 Conclusion

Disruptive events, witnessed recently, impacted and still impact normal flows in global operations across industries. Therefore, understanding the role and factors influencing DP providers' intention to implement their solution for providing platform-based business models and operations needs to be explored further. Specific and more in-depth research is needed regarding the interaction with other stakeholders who are just adding to the already high complexity of operations. Although the research is based on a literature review of a small number of scientific articles that are narrowly focused on DP providers, which is a limitation of this research, it indicates that certain factors influencing the role and behaviour of DP providers exist regardless of diversity platforms described in various papers. To the best of our knowledge, there is still a lack of papers dealing with transformational changes of organizations when implementing, joining, or adopting DPs. Therefore, this research is intended to shed some insight into understanding what and how influences different stakeholders to consider platform-based interactions.

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