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Digital platforms for development: Foundations and research agenda

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Abstract

Digital platforms hold a central position in today's world economy and are said to offer a great potential for the economies and societies in the global South. Yet, to date, the scholarly literature on digital platforms has largely concentrated on business while their developmental implications remain understudied. In part, this is because digital platforms are a challenging research object due to their lack of conceptual definition, their spread across different regions and industries, and their intertwined nature with institutions, actors and digital technologies. The purpose of this article is to contribute to the ongoing debate in information systems and ICT4D research to understand what digital platforms mean *for* development. To do so, we first define what digital platforms are and differentiate between transaction and innovation platforms, and explain their key characteristics in terms of purpose, research foundations, material properties and business models. We add the socio-technical context digital platforms operate and the linkages to developmental outcomes. We then conduct an extensive review to explore what current areas, developmental goals, tensions and issues emerge in the literature on platforms and development and identify relevant gaps in our knowledge. We later elaborate on six research questions to advance the studies on digital platforms for development: on indigenous innovation, digital platforms and institutions, on exacerbation of inequalities, on alternative

forms of value, on the dark side of platforms and on the applicability of the platform typology for development.

1 | INTRODUCTION

Digital platforms hold a central position in the business models of the largest companies in the world, transforming traditional roles in areas like employment, productivity and innovation activities. Four of the largest firms in the world in terms of market value in late 2018 were Microsoft, Apple, Amazon and Alphabet – all platform companies (Cusumano et al., 2019). If adding the three other platform leaders, Facebook, Tencent and Alibaba, these seven companies represented close to $5 trillion in market value and were reported to account for two-thirds of the total market value of the world's 70 largest digital platforms in 2018 (UNCTAD, 2019). Although most of these platforms have their origins in the global North and China, digital platforms are becoming important players in the global South due to increased access to devices and connectivity in these regions, with new platform companies also being established there. A good example of this is the Latin American digital platform, *Mercado Libre*, which started in Argentina and today operates in virtually all countries of the region.

The global scale of digital platforms presents the potential to generate social and economic value for development, yet how this happens is not entirely understood or studied. Practitioners and scholars acknowledge their significance for societies in the global South (David-West & Evans, 2015; Nielsen, 2017; Walsham, 2017), but it is less obvious in what ways digital platforms can trigger specific positive effects *for* development. In addition, despite the fact that these digital platform giants have generated enormous wealth in record time, that wealth has been concentrated around a small number of companies and countries, giving rise to concerns on the developmental effects these new technologies may have for the global South.

Part of the problem in grasping the implications of platforms for development in the field of information systems has been the lack of clarity regarding the understanding of what digital platforms are, what their main features are and how they generate value (de Reuver et al., 2018). Notably, even valuable landscape papers in information systems largely ignore the development implications of digital platforms (de Reuver et al., 2018) or may summarize them in rather naïve ways. For example, to suggest that online labour platforms may be highly beneficial for 'new-collar workers' in developing countries (Constantinides et al., 2018) is rather a contested if not debatable statement. Digital platforms, as information technologies for development (ICT4D) more in general (i.e., Zheng et al., 2018), are rarely isolated from the complex social dynamics, issues of power and driving forces behind them (Cusumano et al., 2019). As a result, digital platforms are a challenging research object that spread across different regions, disrupt industries and are intertwined with surrounding institutions, markets and other digital technologies.

The aim of this article is to contribute to the ongoing debate in information systems and ICT4D research (Avgerou, 2017; Nielsen, 2017; Walsham, 2017; Zheng et al., 2018) by addressing the following question: What do digital platforms mean *for* development? We understand development in a broad sense as the short to medium-term outcomes of desirable targets, such as good health, reduction of systemic poverty, inequalities and so on. We therefore consider development in a more holistic sense that goes beyond economic growth (Zheng et al., 2018) to encompass the attainment of outcomes as exemplified in the sustainable development goals (SDGs). Our intention is primarily to understand in what ways digital platforms contribute to developmental outcomes, instead of focusing on the diffusion and adoption of digital platforms *in* developing countries. The decision to take a broad view on development therefore allows us to accommodate, instead of prescribing, diverse perspectives that authors and scholars may take on the subject that would otherwise may be left out in our study.

To achieve our purpose, we first offer a typology of digital platforms based on extant literature from management and platforms research. We differentiate between the categories of innovation and transaction platforms, and discuss their key characteristics in terms of purpose, research foundations, material properties and value creation

mechanisms. We review the socio-technical context digital platforms operate, using the notion of platform ecosystem, stakeholders and governance, and linkages to developmental outcomes. Taken together, the analytical typology and sociotechnical features of digital platforms for development are later used to guide an extensive literature review in information systems and ICT4D outlets. In the review, we assess relevant themes, knowledge and applications as well as research gaps. We then propose a research agenda for future work in the form of six research questions. These are: on innovation platforms and local development; on platforms and the creation of institutions; on platforms and inequalities; on business platforms alternatives; on the dark side of platforms; and on the need to explore further categories of platforms for development. Concluding remarks follow, including limitations of our work.

2 | DEFINING AND POSITIONING DIGITAL PLATFORMS

Digital platforms share three basic characteristics: they are technologically mediated, enable interaction between user groups and allow those user groups to carry out defined tasks (Cusumano et al., 2019; de Reuver et al., 2018; Gawer, 2009). This is reflected in a recent review on the subject, where Constantinides et al. (2018) understand digital platforms as a set of digital resources, be those services or content, which facilitate interactions between its participants. The specific nature of the platform depends, however, on the type of task its participants are trying to effect (Jacobides et al., 2018).

Definitions of digital platforms depend somewhat on the field in which they are studied. In studies concentrating on the technological components of digital platforms, the focus has been on their technological and digital characteristics such as layered architecture and modularity (Yoo, Henfridsson, & Lyytinen, 2010). In information systems, attention has also been given to the socio-technical dimensions of digital platforms, for example their impact on organisational structures or international standards (de Reuver et al., 2018). Within economics, the discussion has evolved around the demand and supply functions within these platforms and how these are different from other types of market settings (Evans & Schmalensee, 2016). From an industry point of view, digital platforms are presented in terms of characteristics such as market capitalisation, ownership, sector or industry they are situated within, governance model, country of origin, geographical reach and underlying purpose (Evans & Gawer, 2016).

Platforms are distinct from other types of digital artefacts. In their study of the internet as an information infrastructure, Hanseth and Lyytinen (2016) position applications, platforms and infrastructures as different 'units of IT design classes' with increasing orders of complexity in architectural design and governance. Principle differentiating features across these design classes include the degree to which they are open and shared and that control over them is decentralised. Applications lie at one extreme of this spectrum and infrastructures lie at the other. Platforms lie between them as they have a facility for being relatively open and shared but control over them is typically centralised (Hanseth & Lyytinen, 2016). Although positions of IT artefacts on this spectrum are on a continuum, for example platforms and infrastructures may share some common characteristics (Constantinides et al., 2018; Helmond et al., 2019; Plantin et al., 2018), platforms bring distinct characteristics that have unique implications for development.

We suggest that digital platforms are a distinct type of information technology (IT) artefact with distinct properties, which lend particular affordances for development. Furthermore, digital platforms are a socio-technical phenomenon that require careful consideration of how they function in a social context. When taken together, this sociotechnical perspective on platforms has consequences for developmental outcomes. For that reason, we consider their technical properties, their functioning in a social context and the resulting consequences for development in turn.

2.1 | Digital platforms as IT artefacts

The technical properties of platforms differ according to their type and purpose. We follow Cusumano et al. (2019) who define platforms according to their principal purpose and identify two broad categories of digital platforms:

TABLE 1 Key characteristics of innovation and transaction platforms

Category of digital platform	Transaction	Innovation
Purpose	Matches users or user groups, the value for a user increases with the number of users in a user group	Enables the creation of applications and services by third party developers based on combining and recombining functionality sourced from a platform core
Focus with platform literature	Driven by economics perspectives of direct and indirect network effects	Driven by innovation management and software engineering perspective on modular architectures
Underlying digital characteristics	The expansibility of digital information and its non-rivalry in use enables the scope and scale of platform services Massive processing power powering platforms enables the search and exchange of information reducing frictions and costs traditionally associated with these operations.	Potential for innovation enabled by generativity. Driven by the re-combinability of digital information and functionality. Ready access to cheap easy to use digital tools to facilitate software development at scale.
Basis of value creation	Facilitating the exchange of information and services between third parties • Matchmaking – value from increasing the size of the pool and then increasing the likelihood of a better match (quality). • Reducing friction making interactions and transactions as easy as possible	Facilitating the innovation of new services by third parties (generally and without supplier contracts) • Opening up functional capabilities for third parties to innovate with • Resourcing developers with the capabilities they need to innovate
Source of value capture	Charging for access to platform or charging commission on sales of services that platform enables. Additional sources of revenue include advertising.	Charging for access to platform through licensing arrangements or charging commission on sales of complementary services that platform enables. Advertising.
Examples	Alibaba.com, Mercado Libre, Whatsapp, Taobao, MPesa, Jumia, Esoko, GoJek, Uber, Afristay	Android, SAP, DHIS2, iOS, AliOS

transaction platforms and innovation platforms. In what follows, we detail the different types of platforms, we explore their purpose and origins and positioning in the academic literature. We examine their materialities and potentialities as digital artifacts as well, their basis for value creation and capture, and the resulting implications for development. A summary of the characteristics of transaction and innovation platforms is shown in Table 1 below.

2.1.1 | Transaction platforms

Purpose and origins

Much research has concentrated on digital platforms as transaction platforms, sometimes referred to as multi-sided markets or exchange platforms. Their main purpose is to facilitate transactions between different organisations, entities and individuals, such as connecting buyers with sellers, recruiters with job seekers and drivers with passengers. The origins of digital platforms in the sense of enabling transactions has its foundations in the boom-bust years of the dot.com era at the cusp of the new millennium. The term 'platform' was associated with many of the new start-up business models that emerged at this time using internet-based applications facilitating transactions between multiple sides of a market and benefitting from networks effects. Transaction platforms can be further divided according to their principal purpose. These include for example social media platforms (e.g., *Facebook* – on a global basis), e-commerce (*Mercado Libre* – originating from Argentina), the 'gig' economy platforms (*Gojek* – originating from Indonesia), platforms built around the notion of the sharing economy (*Afristay* – originating from South Africa), online portals and app stores (*Freebasics* – originating from internet.org) and platforms enabling digital identity (*Aadhaar* – originating from India).

Positioning in academic literature

In the platform literature (de Reuver et al., 2018), transaction platforms are often studied from the perspective of economics as their management is related to areas such as pricing and contractual factors. The economic perspective focuses on the possibility of connecting seemingly disperse groups and the benefits rely principally on the presence of network effects, whether direct or indirect. Direct network effects refer to the utility of the network (or platform) increasing to each member as more users join for the same essential use as seen in the case of digital platforms like M-Pesa and Whatsapp (Gawer, 2014). In contrast, indirect network effects in multi-sided platforms refer to the benefits derived by increasing the size of groups that are complementary to each other. Here, the decision to join a platform from the perspective of one side (e.g., demand side) is influenced by the number of users in a complementary group (e.g., supply side) and vice versa, as seen in digital platforms such as Gojek and Afristay (Hagiu & Wright, 2015). Although the generation of network effects can be the source of tremendous benefit to users and profit for platform owners, they can eventually lead to winner-take-all scenarios, where industries are dominated by a few platform players (Gawer, 2014), potentially leading to detrimental impacts on users. Economics perspectives on transaction platforms have increasingly turned their attention towards the emergence (how platform come to be) and evolution (how they develop) over time (Eisenmann et al., 2008, 2011), as well as encompassing other groups of participating actors other than simply buyers and sellers (Gawer, 2014).

Materialities and potentialities

The increasing ubiquity, reach and falling costs of digital technologies such as mobile phones and mobile data networks including 3G, have contributed to the rapid growth in transaction platform applications and access to them. However, it is the underlying material properties of digital technology and immaterial properties of digital data, from which they are composed, that has further accelerated this growth. It is these properties that afford the sources of value creation for transaction networks. The falling costs and vast capacity of memory and processing power which drives the cloud-based infrastructure within which transaction platforms are typically hosted is such that the information that they can store and the process is almost infinitely expansible (Faulkner & Runde, 2011, 2019). This

allows for the storage of the ever-increasing amounts of data associated with massive installed bases of users that have exploded through network effects. The processing power of the underlying infrastructure is such that there is non-rivalry is use (Faulkner & Runde, 2011), which implies that vast amounts of users can access transaction platform services without being affected by the simultaneous use by others. Furthermore, this processing power enables the search and exchange of information at speed and scale which largely eradicates the frictions and costs associated with these operations were they to be carried out non-digitally. It is the memorability, programmability and communicability as properties of users' devices as digital technologies (Yoo, Henfridsson, & Lyytinen, 2010) that enables individuals to access these transaction platform services, when they could not have done before.

Basis for value creation and capture

When these various characteristics of transaction platforms are taken together, the basis of value creation can be summarised as facilitating the exchange of services and information between different parties of a multisided market. Specifically, this comes from two aspects. The first is through matchmaking, which is the enablement of searching and finding an appropriate opposite to transact with, and the second through the reduction of frictions in the resulting interaction and transaction (Cusumano et al., 2019). Social media platforms, as an example of transaction platforms, offer further opportunities for value co-creation (Alaimo et al., 2020) as they enable users to create content in addition to exchanging it. Transaction platforms capture value through a variety of mechanisms, including charging parties' access to the platform services through membership charges or per use access, as well as through claiming a commission as a percentage of the value of charged by the party providing service. Many transaction platforms, notably social media platforms, profit by monetising data captured from the profiles and behaviour of their users, analysing it, and sourcing it for targeted advertisement, which has led to critiques regarding the hidden and unethical uses of it (Zuboff, 2015).

Examples and implications for development

At first sight, it might seem that the term transaction platform is oriented simply towards commercial applications, economic-driven objectives. We argue that Cusumano et al.'s (2019) categorisation of platforms, and the potentialities that each of these types offer, are equally suited to grasp the broader context of achieving developmental goals. According to Cusumano et al. (2019, p. 19), 'transaction platforms are largely intermediaries or online marketplaces that enable seemingly distant people and organisations to *share information* (emphasis added), to sell, buy or access a variety of services'. Its essence is therefore to enable seemingly distant people and organisations to exchange and share information. This fundamental characteristic has applications for socio-economic development as well as purely commercial settings. In other words, it is the underlying digital technology properties and the potential to scale that make transaction platforms powerful and relevant for development.

Examples of transaction platforms with implications for socio-economic development abound in the global South. Social media platforms, such as *Facebook*, for example, may contribute to poverty alleviation by broadening access to resources (time, expertise and support) and information (including job opportunities or benefits advice), as well as facilitating collective action and influence (such as social campaigning or warrant a voice in local affairs; Nicholson et al., 2016). The sharing economy platform *Gojek* in Indonesia, for instance, has facilitated rapid growth and employment by connecting the self-employed with consumers for the supply of a wide range of services. The platform bootstrapped on an initial set of delivery services enabled by *Ojeks* (or motorcycle taxi drivers), and grew to encompass a broad range of services provided by other entrepreneurs ranging from cleaning to wellbeing services (Kien & Raharso, 2017). Other indigenous ride-hailing platforms have also emerged in the Sub-Saharan Africa with its own specificities. One example of this is *SafeBoda* in Uganda, a ride-hailing app for motorcycle taxis operating in Kampala, which focuses to contribute to road safety – a recognised problem in the city. Measures introduced by *SafeBoda* include providing helmets and enabling cashless payments for passengers and training drivers in road safety (Rosen, 2017). In the agriculture sector, Ghana's *Esoko* has enabled small farmers in Africa to secure better prices for their produce by providing them information on market prices (Hildebrandt et al., 2020). Activist mapping examples like *Ushahidi* or *Map Kibera* enable local users to report events related to human rights, election monitoring and

TABLE 2 Transaction platform subcategories relevant for development

Subcategory	Example	Potential positive and negative effects
Social Media	Facebook	Positive • Broadening access to resources (time, expertise and support) • Broadening access to information (job opportunities, benefits advice) • Facilitating collective action and influence (social campaigning or warrant a voice in local affairs) Negative • Propagation of misinformation/disinformation; ideological polarisation • Discrimination of services based on users' preferences • Users' addiction, changes in behaviour • Citizen surveillance
Sharing Economy	Gojek	Positive • Facilitating work opportunities, which boost income and formalize employment markets Negative • Worker exploitation, lack of employment rules and protection
Knowledge Sharing	Ushahidi	Positive • Enabling the co-creation of knowledge • Facilitating access to information and sharing of knowledge • Enhancing accountability, transparency and inclusion Negative • Propagation of misinformation • Augmenting inequalities to those with access/willingness to report, contribute
Digital Identity	Aadhaar	Positive • Authenticating citizen identity for access to and provision of public services • Registering and recording the ownership of assets to citizens Negative • Citizen surveillance

humanitarian crisis contributing to enhancing accountability, transparency or inclusion. Ushahidi or Map Kibera are typical examples of platform value being co-created with users' generated content. National systems of electronic identification, such as *Aadhaar* in India, can also be seen as transaction platforms which capabilities are used to access additional public services (Mir et al., 2020). The ability to authenticate the identity of citizens within multi-party networks has transformational consequences for development (Gelb & Clark, 2013).

These examples also suggest that it is possible to distinguish sub-categories of transaction platforms, each of which has characteristics that may facilitate or hinder developmental goals. Although not exhaustive, Table 2 outlines a range of transaction platform sub-categories relevant for development with examples of their potential positive and negative effects.

2.1.2 | Innovation platforms

Purpose and origins

Innovation platforms act as 'foundations upon which other firms can build complementary products, services or technologies' (Gawer, 2009, p. 54). In this way, the technical architecture of an innovation platform contains modules, or building blocks, as 'accessible innovative capabilities' (Gawer, 2014). These modules can then be accessed and combined by apps developers (complementors) to build apps and services (known as platform complements). This arrangement, enabled by innovation platforms, is at the heart of a global 'app-economy' worth over $100bn in revenues in 2019 (Dignan, 2019). Innovation platforms are exemplified by mobile operating systems such as Android

and iOS, whose functionality is drawn upon through APIs by a platform ecosystem of third-party developers to build and innovate apps as services. Other forms of innovation platform extend to cloud services such as Amazon Web Services, Google and Microsoft Azure, enterprise platforms such as Salesforce.com and SAP, as well as enterprise IoT platforms such as Siemens *Mindsphere*. These Global North, commercially-driven innovation platforms provide the foundations for indigenous service innovation in local contexts. There are, in addition, innovation platforms that are designed for development or are situated in a local context. These include healthcare informatics platforms such as District Health Information Software 2 (DHIS2), and open government data platforms, such as Buenos Aires Data run by the government of Buenos Aires.

Positioning in academic literature

For the case of innovation platforms, the platform literature typically applies innovation management and software engineering design perspectives (Gawer, 2014). It considers platforms as modular architectures (Ulrich, 1995), which are partitioned into a core and periphery (Baldwin & Woodard, 2009), and governed centrally by a platform authority (Ghazawneh & Henfridsson, 2013; Wareham et al., 2014). The core architecture of a platform contains modules, which are accessed through interfaces (APIs) and combined by developers (complementors) to innovate apps and services. From an architectural perspective, these apps and services reside in the peripheral architecture of the innovation platform (Tiwana, 2014), distinct and separate from the core architecture. We illustrate the distinction between the core and peripheral architecture in the Figure 1.

The modules that make up the core architecture of a digital innovation platform typically consist of functionality, which can then be accessed by developers (complementors), who combine and innovate them as services and apps in the peripheral architecture. This is what would be seen in most commercial platforms, such as mobile operating systems like Apple's iOS or Google's Android. In which case it is typically the owner of the platform (the platform authority) who sources and contributes these modules. However, it is possible to have core modules, which consist of data rather than functionality. These core modules consisting of data might be seen in other forms of innovation

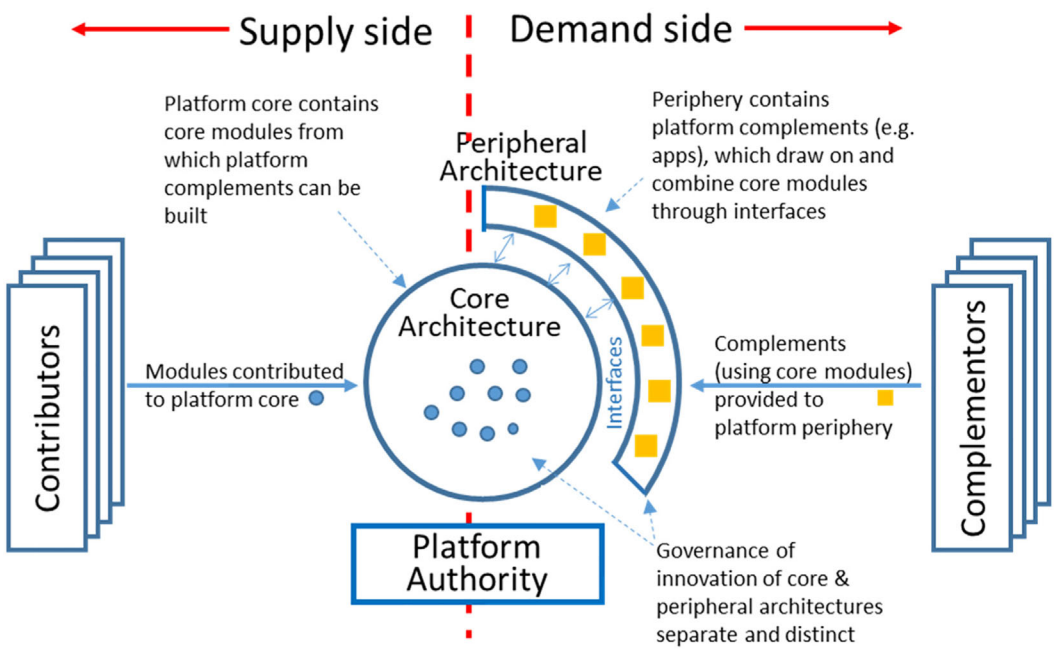

FIGURE 1 Overview of innovation platform functional architecture

platforms, such as Open Government Data (OGD) platforms (Bonina & Eaton, 2020). It is also possible that modules in the core might be sourced from contributors other than the platform authority. For example, in the case of OGD platforms, several government units, separated from the platform owner, supply core modules (Bonina & Eaton, 2020) that form that basis of platform complements. The category of innovation platforms, and their specific generative core-periphery architectural structure, does not limit all innovation connected with platforms to this type. For example, the focused functionality of many types of transaction platforms (e.g., payment platforms and identity platforms) can be accessed and incorporated by a very limited set of APIs into other digital services using that specific functionality. However, the essence of innovation platforms is the variety of functionality and interfaces that the offer up allowing for a broad generative scope of different types of innovation.

Materialities and potentialities

The capacity for digital innovation platforms to enable an almost infinite scope of applications to be developed is also derived from the underlying material properties of digital technology and immaterial properties of digital information. The essence of a digital innovation platform is the ability for developers to take underlying platform functionality, accessed through APIs, and arrange it through the logic of algorithms into applications. This effort relies on the combinable and re-combinable properties of the non-material digital artefact (Faulkner & Runde, 2011) and benefits in turn from the generative potential of digital technologies (Zittrain, 2008) to enable an almost limitless variety of application innovation. Beyond this, as Yoo, Henfridsson, and Lyytinen (2010) point out, digital technologies such as mobile handsets and digital watches have properties of sensibility and addressability as their capabilities are enriched through the inclusion of sensor components. These components range from GPS and gyroscopes to track movement and positioning, which may enable for example applications increasing agricultural productivity, to electrodes that can measure and monitor bio-signals, with applications in healthcare. Access to these burgeoning sensor-based capabilities in applications is also opened up and enabled through APIs, which further enrichen the scope of platform-based innovation possibilities for development. The self-referential nature of digital technology (Yoo, Henfridsson, & Lyytinen, 2010) is such that digital technologies (e.g., software development kits) are required to innovate further digital technologies (e.g., applications). However, the increasing reach and ubiquity as well as reducing the cost of technologies is such that the locus and heterogeneity of innovation is broadening (Yoo, Henfridsson, & Lyytinen, 2010). The outcome is that digital innovation platforms enable both more access to innovate and an increasing pace of innovation, which was previously not possible.

Basis for value creation and capture

When the characteristics of an innovation platform are taken together, value is created with the myriad of new services that are generated as platform complements by independent third-party developers. Value creation is enabled by opening up the innovation platform to third-party developers and resourcing them with the capabilities that they need to innovate. Innovation platforms usually capture value (monetisation) by charging either the third-party developers for access to platform resources or to consumers by directly selling or renting a service. Advertising is also used as a monetisation strategy when the platform is free (e.g., Google Android).

Examples and implications for development

Just as Cusumano et al. (2019) notion of transaction platforms are relevant for categorising platforms in the context of development so are innovation platforms. These categories have theoretical foundations that help bring clarity to our understanding of what a particular platform can and cannot accomplish and enables further subcategorisation. The implications of digital innovation platforms for development is twofold. First, the established commercial innovation platforms, such as Apple iOS, Android and others, allow for the generation of applications in a local context. Given the increasing penetration of mobile internet access in the global South, it comes as no surprise that there is a myriad of apps that run on those platforms. Virtually all governments have developed apps for their services (United Nations, 2020) – whether functional or not. For example, in Brazil, the government's welfare programme *Bolsa*

Família (Bolsa Família, 2020) has developed its own mobile app so recipients from low-income families can keep track on their cash transfers or check what their nearest point of attendance is. The apps economy has itself flourished in the Global south as a result too. In Sub-Saharan Africa, numerous tech hubs such as *iHub* in Kenya or the *CcHub* in Nigeria have been established, which among other activities, host start-ups that create complementarities for the existing innovation platforms in the form of applications (Bright, 2019). There appear to be few examples of large established commercial innovation platforms that have emerged outside of the global North, such as the Chinese *AliOS* – though the latter, largely built on Android. Second, innovation platforms can be created specifically with the intent of supporting innovation for development in a local, non-commercial context, often established by NGOs. An exemplar of this is the DHIS2, an open-source innovation platform for health information management and health care services, managed by the Health Information Systems Program (HISP) at the University of Oslo. As an innovation platform, the DHIS2 platform provides core components for data collection, management and analysis that are locally adapted and configured by a global network of HISP collaborators in more than 70 low and middle-income countries. In this way, cheap and ready access to easy to use software tools enables local developers create platform-based services for an immediate context. The relative success of the DHIS2 initiative cannot be attributed to the platform artefact in isolation, but rather as a combination of a range of wider social-technical elements as we explore shortly. The advantage of these innovation platform types, which often capitalise upon open-source architectures, is that they can be efficiently and rapidly replicated in multiple territories, and that they allow local developers to capitalise on specialised context specific capabilities to innovate services for the local context. Third, innovation platforms can be created by governments to facilitate the innovation of citizen centric services, which can facilitate development in a local, non-commercial context. These types of innovation platforms can be closed, only allowing service development from within government, or they can be open to allow wider societal innovation of services. These types of innovation platforms are typified by open government data platforms, which have become prominent and relevant in regions like Latin America (Bonina & Eaton, 2020). These types of innovation platform may also capitalise on open-source platform architectures, and they also enable development to occur, which benefits from specialised context specific capabilities to innovate services for local contexts.

2.2 | The socio-technical nature of digital platforms

Although digital platforms as IT artefacts have an essentially technical basis, they rarely exist in isolation. At a basic level, they exist within an immediate network of stakeholders, which are combined and interact in complex ways. At a broader level, their existence, use and evolution are influenced by a broader set of economic, organisational, institutional and spatial forces with implications for development. The following section examines the socio-technical setting within which digital platforms reside.

2.2.1 | Platform ecosystems and stakeholders

Traditionally, the digital platform literature refers to a 'platform ecosystem' (Jacobides et al., 2018) to the broad set of actors that contribute to the functioning of a given platform (Ceccagnoli et al., 2012; Gawer & Cusumano, 2008). The concept of ecosystem was initially adopted in the management literature to describe how systems or networks of organisations compete. In this setting, ecosystems of organisations must adapt and co-evolve to survive and seek dominance (Moore, 1993). The metaphor was then adapted to describe clusters of interdependent organisations structured in constellations rather than traditional value chains, and the corresponding strategies that are required for these organisations to create and capture value on a sustainable basis (Iansiti & Levien, 2004) to maintain viable collaboration. The management literature (Ceccagnoli et al., 2012; Gawer & Cusumano, 2008; Jacobides et al., 2018) assumes a 'hub and spoke' structure of peripheral companies interacting with a central platform authority through

standardised interfaces (Jacobides et al., 2018). This literature recognizes that relationships within these immediate ecosystems go beyond simple supplier customer relationships and business models involving simple financial transactions.

In contrast to the approach used by management scholars, other information intensive fields consider the term ecosystem signifying complex and heterogeneous systems of institutions, groups of actors, infrastructure and data, which interact, adapt and grow in the context of environmental change (Dawes et al., 2016; Harrison et al., 2012). This is acknowledged in the ICT4D literature as well, where an ICT ecosystems approach recognizes that technology is one part of mutually interacting, interdependent components that are highly complex in their arrangement (Diga & May, 2016; Nguyen et al., 2017; Nguyen & Mahundi, 2019). Digital platform ecosystems are no different, and comprised of technical, but also social, political and spatial components, that evolve over time following diverse dynamics. Because of its interdependencies, moving a component will affect the entire system.

The case of DHIS2 provides an example on the importance of platform ecosystems and the numerous socio-technical and governance factors impacting the platform and its functioning. DHIS2 was established over 25 years and is managed by HISP, a network of 13 in-country and regional organisations that enable the platform to better capture indigenous factors that affect how services are developed and used. In addition, active education and research programs have been built around the platform's development and usage, including an online academy that provides learning on how to configure and use various platform features. During its existence, DHIS2 has been utilised by several health institutions such as the World Health Organization (WHO) and is supported by other international organisations. In sum, DHIS2 comprises various institutions, stakeholders and additional activities and constitutes an example of an innovation platform part of a complex socio-technical system.

From an ICT4D stakeholder perspective, a digital platform ecosystem will normally include traditional stakeholders such as government, the private sector and non-governmental organisations to also include partnership, networks and hybrid organisations such as social enterprises. Jha et al. (2016) offer a useful perspective to understand a generic view of the main stakeholders and interactions involved in a platform ecosystem for development. Based on a study on *eKutir* – a platform to help reducing poverty in India, their study reveals an ecosystem with five critical elements: (a) technology (infrastructure, applications and data), (b) intermediaries (a network of micro-entrepreneurs), (c) communities (of farmers), (d) institutions (business models) and (e) partnering organisations (NGOs, social enterprises and international organisations). Their case shows an incremental approach that started with specific, ICT enabled properties to benefit a network of farmers that then expanded in sustainability, scale and scope based on networks of collaborations and partnerships. These mechanisms may be different from the platform governance/ecosystem approaches documented in the management literature (Cusumano et al., 2019). Therefore, an ICT4D perspective highlights the broader set of actors, dynamics and relationships in which digital platforms may be positioned.

2.2.2 | Platform ecosystem governance

The digital platform literature (Ghazawneh & Henfridsson, 2013; Wareham et al., 2014) considers the platform owner sitting at the centre of a wider platform ecosystem (Iansiti & Levien, 2004) as responsible for governing members of the ecosystem. This is one account of the platform owner having property rights (Hart & Moore, 1990) over the functionality at the core of the platform, which bestows control over how and by whom it is accessed and used. Crucial governance decisions must be taken by the platform authority in order that the platform and ecosystem can be managed appropriately. Authors such as Tiwana (2014) identify additional areas that need to be managed or governed by a platform authority, such as; (a) gatekeeping – who is in or out of ecosystem, how they must behave; (b) platform evolution – deciding how platform functionality evolves and who should influence that decision; (c) decision rights – who gets to decide what, and what is the division of authority and responsibilities between platform owner and other ecosystem members (e.g., apps developers).

In the case of both transaction and innovation platforms, many elements of the platform governance relationship between centralised platform authority and distributed ecosystem members can be theorised through the notion of boundary resources (Ghazawneh & Henfridsson, 2013). Boundary resources refer to the software tools and regulations that serve as the interface for the arm's-length relationship between the platform owner and ecosystem members. On the one hand, certain boundary resources can act as tools which resource ecosystem members in their interactions with the platform. In the case of developers writing apps for an innovation platform these tools may come in the form of APIs enabling access to platform functionality or software development kits (SDKs). In the case of a transaction platform, such as *Afristay* – a sharing economy platform for accommodation in Africa, a tool might come in the form of valuable additional functionality enabling cleaning services to be located and ordered by a host. In contrast, other boundary resources act as rules, which secure the platform against behaviour from ecosystem members which might damage the value and integrity of the platform for other ecosystem members. In the case of an innovation platform, this type of boundary resources might encompass rules forbidding the creation of malicious content, or in the case of a transaction platform rules forbidding malicious behaviour on the part of a service provider.

Approaches to governance such as the development of securing and resourcing boundary resources have implications for development, mainly in the form of managing platforms responsively, economically and at scale. The services that transaction platforms provide, and the local applications that innovation platforms enable, do not require the costly resource intensive governance that traditional service provision and management of innovation might require. A further implication is that the remote digitally mediated platform governance that boundary resources enable also allows for engagement with platforms at scale. In addition, digitally mediated governance can be quick to establish and evolve, and it can be effective immediately as it is controlled centrally. An example of the effective and efficient governance of an innovation platform in a context for development is illustrated by the case of establishing open government data platforms in Latin America (Bonina & Eaton, 2020). These cases demonstrate instances of how the skilful alignment of government and NGO institutions, developers and entrepreneurs and the establishment of coherent platform governance facilitated the growth of vibrant platform ecosystems. In those cases where there was a lack of alignment and a lack of coherent governance, platform ecosystems were slower to establish.

Understanding broader governance arrangements of digital platforms matters for development. Governance studies in the platform literature, however, typically focus on the immediate relations between the platform authority and its users, partners and developers (Ghazawneh & Henfridsson, 2013; Karhu et al., 2018). With the exception of some studies, for example Eaton et al. (2015), there is little attempt to examine the influence of the wider ecosystem members and stakeholders such as regulators, governments and alike on governance regimes. The impact of the wider ecosystem on the governance of platforms has to date been largely concentrated in settings most exposed to government regulation. For example, the role of the government and politics in regulating the platform economy is one area that has received scholarly interest (Thelen, 2018). Such wider analysis may be helpful, for example, to shed light on the sociopolitical dynamics that may result in the concentration of digital platforms in a few regions of a few countries (Eaton et al., 2015). Well-documented threats of concentration and dominance of Global-North (if not USA-owned) digital platforms (Cusumano et al., 2019; UNCTAD, 2019) are particularly relevant for the role of these platforms for development. Growing dominance of a few global digital platforms may promote their own products and services and crowd out homegrown ones, as well as to enable an unprecedent opportunity for social discrimination and behavioural influence based on continuous tracking of data (Couldry & Mejias, 2018; Zuboff, 2015). While the rudimentary governance and regulation of technology in many countries in the Global South may open opportunities for greater innovation, it increases the potential for greater ethical, social and political harm (UNCTAD, 2019).

The pace and dynamics of governance may also be overlooked in development contexts. Jha et al. (2016), for example, demonstrate the importance of governing the ecosystem in incremental and sustained ways. In their study of eKutir, the authors show how eKutir progressively expanded from a minimal constellation of actors (the digital platform, micro-entrepreneurs and farmers) into an ecosystem that escalate and grow in scope to partner with other agricultural ventures and international organisations like the World Trade Organization (WTO). To do so, it required

embedding and institutionalising a growing number of actors and their practices into the local contexts of a large number of communities. Similarly, Avgerou and Li (2013) study the successful case of Taobao in China – the largest e-commerce site in the world, and show how digital tools, institutional rules, culture and a diversity of actors are all embedded to create locally sustainable economic activities. Local practices and rules – if not institutions – are another relevant aspect in the governance of digital platforms for development.

2.3 | Digital platforms for development: A summary

We understand digital platforms to be a class of IT artefacts that have distinct purposes, which are enabled by specific underlying digital characteristics or properties. We also understand platforms to reside in a socio-technical setting where they interact with an ecosystem of immediate stakeholders and a broader set of economic, organisational, institutional and spatial forces. Within this socio-technical setting, the platform owner may govern the interaction of the immediate ecosystem; this governance, in turn, is subject to influence by wider institutional forces, including wider governance or regulatory action. The developmental outcomes, on the other hand, also influence the socio-technical context in which digital platforms operate (e.g., Zheng et al., 2018). When taken together, the combination of these properties derived from platforms as IT artefacts and their accompanying socio-technical elements may afford particular outcomes for development. It is this broad understanding of digital platforms that informs our review of the literature on platforms and development and enables us to generate a number of key dimensions that characterize this literature.

3 | DIGITAL PLATFORMS AND DEVELOPMENT: THE STATE OF THE ART

The emergence of digital platforms in the developmental agenda is a relatively new phenomenon. Back in 2001, the United Nations' Human Development Report (UNDP, 2001) addressed the role of technologies in development, but it only mentioned digital platforms in one instance as a way of sharing data. In the academic literature, there are some examples from the early 2000 that touch the topic of platforms vis-à-vis development (e.g., Mansell, 2001). However, based on analysis of results in research search engine sites such as the Web of Science, it is only relatively recently, approximately in the last 5 years, that digital platforms have found their way in to mainstream of topics in ICT4D. This increased interest is reflected in this special issue, or the digital platforms and development tracks in ICT4D conferences (e.g., Nielsen & Kimaro, 2019). International organisations such as the UNCTAD (e.g., UNCTAD, 2019) and the World Bank (e.g., World Bank, 2018) have also paid much more attention to this phenomenon. For example, the latest UNCTAD Digital Economy Report of 2019 (UNCTAD, 2019) is practically dedicated entirely to the role of digital platforms and value generation for development. One explanation for the rise in interest towards platforms and their role in development could be the successful examples of platforms such as M-Pesa and Ushahidi, which both emerged from the global South prior to 2010 and have had a relatively clear developmental impact. In addition, the large growth rates of mobile phones in many developing countries (Donner, 2015) have likely facilitated the uptake of digital platforms and played a role in utilising digital platforms to solve developmental challenges.

From a business perspective, except for China, there is a scarcity of studies in management or information systems that would focus on the deployment and development of digital platforms in the global South. One of the few exceptions was a global survey on platforms conducted in 2015 (P. Evans & Gawer, 2016), which had a special chapter on Africa (David-West & Evans, 2015). The survey found that most platforms operating in Africa were transaction platforms, largely connecting two sides of a market – job seekers and employers, buyers and sellers, travelers and accommodation. Some of these platforms were three-sided as they involved an advertiser. The African survey did not identify the presence of innovation platforms, which may not be surprising given the large resource-intensive

capabilities needed to enable those. A key challenge for platform companies in Africa, the survey showed, has been the high constraints to establish themselves and scale, which can for example be attributed to poor infrastructure, limited access to banking and wary customers (David-West & Evans, 2015). The report highlighted, however, specific areas in e-commerce, ride sharing, payment systems and workplace engagement where African platforms potential may accelerate or construct next-generation markets. To do so, a unique characteristic of these platforms has been the ability to attract capabilities and resources from the global marketplace and combine them with African entrepreneurship and deep knowledge of local markets to advance their position.

The motivation of this article suggested a similar pattern: there is little systematic understanding of what digital platforms mean for development. We therefore conducted an extensive literature review on the four leading ICT4D journals (*Information Technologies & International Development*, *Information Technology for Development*, *The Electronic Journal of Information Systems in Developing Countries*, *World Development*) and eight information systems (IS) journals (*European Journal of Information Systems*, *Information Systems Journal*, *Information Systems Research*, *Journal of AIS*, *Journal of Information Technology*, *Journal of MIS*, *Journal of Strategic Information Systems and MIS Quarterly*). Research on specific platform-related areas, such as gig-economy, occurring in developing countries has been published elsewhere as well. However, we decided to leave these journals out of our focused review, as our aim is to take stock onto how digital platforms and their connection to development have been studied within the research domain of information systems and development, and to inform paths for future work within our discipline accordingly. As we were interested in any studies on platforms that would either have implications for development or be situated in developing countries, we conducted a broad search using the terms 'platforms' or 'platform', 'development' or 'developing countries' in all search topics. Our search yielded a total of 55 papers in ICT4D journals and 50 in IS. To assess their suitability, we read the abstracts and introductions as well as the discussion section. We discarded those articles that did not, theoretically or empirically, refer to developmental settings, focus on non-digital platforms or that understand digital platforms differently to our definition in this article. For example, we excluded publications on governmental websites that claimed to be platforms but concentrated instead on unidirectional e-government services, that is, providing information for citizens without enabling two-way conversations, matchmaking or similar functions. On this basis, we ended up with 49 articles, 43 in ICT4D and 6 in IS outlets. The summary of the literature is presented in Table 3 below.

In order to classify the literature and detect emerging themes, we read all the selected papers in full, and we categorised them according to the type of platform that was discussed (transaction and innovation), their material properties (application, website, SMS etc.), the main area of development they contributed towards (e.g., employment, health, agriculture, governance), primary operating location and other relevant socio-technical factors. In addition, we investigated the theoretical underpinnings of these papers especially in terms of the key concepts and constructs concerning digital platforms discussed above as well as specific ways on how these platforms were expected to contribute towards development.

As papers would not necessarily follow our typology, two of the authors classified all papers and reached an agreement as follows. Out of the relevant 49 papers, the vast majority were about transaction platforms (42), with only a few concerning innovation platforms (7). It was not always straight-forward to establish whether a paper's focus was more towards an innovation or transaction platform. Even though the dichotomy between innovation and transaction platform worked theoretically well, this distinction was not always explicit within the literature we reviewed. A paper could for example look at the process of developing an application using a particular innovation platform, yet the developed application itself resembled a transaction platform. In these cases, we looked at the paper's primary focus – that is, whether the paper was concentrating more on boundary resources enabling innovation or on the transactions that took place on the developed application. Similarly, in terms of dividing platforms into further subcategories beyond the two main platform categories (transaction platform and innovation platform), the literature review followed an emergent process in which the aim was to identify distinct development goals to which a given digital platform contributes. The subcategories we identified in this emergent process intentionally did not correspond to the subcategories we described earlier in Section 2; the latter, corresponding to general subtypes of

TABLE 3 Summary of the literature

Category of platform	Primary location	Developmental topic/area	Examples of platforms	Examples of theoretical and methodological stance
Transaction: 42	Global South: 34 - Africa: 19 - Asia: 12 - Asia and Africa: 1 - Latin America: 2 Global North: 2 Not specified/ Global: 6	Agriculture, community and political participation, education, finance, governance	Market information websites, political participation websites, finance-related projects on SMS	Econometrics, design science, social network analysis, ecosystems, action research
Innovation: 7	Global South: 5 - Africa: 4 - Asia: 1 Not specified/ Global: 2	Agriculture, health, education, gender	Developing health management information systems, data provision, knowledge sharing among stakeholders	Social construction of technology, generativity, design science

platforms in a wider context, and not just development. This mismatch, and the resulting implications for further research are discussed later.

Of the 49 publications we reviewed, the earliest one was published in 2011, and most of the papers were published from 2016 onwards (37 out of 49). In general, the underlying technology behind the platforms reviewed referred to relatively basic technologies and architectures, such as SMS or simple websites, yet there were also some exceptions (e.g., Msiska & Nielsen, 2018; Noutat et al., 2016). Geographically, most publications concentrated on countries in Africa and Asia, with only two focusing on Latin America. The studies that had taken place in Asia where either based in Southeast Asia (India and Sri Lanka included) or China. As per the developmental areas covered in the papers, the most frequent ones were linked to governance, health, education, finance or agriculture. In 13 papers, the primary developmental area could not be identified, or the papers concentrated more on contextual issues without having a clear developmental argument or focus.

The literature review revealed that the term 'platform' is used rather carelessly or as an alternative word for other technological concepts such as application or website (e.g., Alampay & Cabotaje, 2016). This was specially the case on the ICT4D outlets. Usually, there was little or no direct discussion or explicit referral to the theoretical underpinnings of platforms in relation to their core characteristics such as ecosystems, network effects, governance or ecosystems, with few exceptions (e.g., Ly & Mason, 2012; Schreieck et al., 2017). Some of the publications concentrated on aspects that were only partially linked to the platforms themselves, such as online medical services, citizen engagement or market influencers for ICT (e.g., Guo et al., 2018; Hussain & Mostafa, 2016; Larios-Hernández & Reyes-Mercado, 2018). The term platform often seemed to be largely taken as given without explicit definitions. In the IS literature, on the other hand, while the research was often grounded in relevant platform-specific concepts, the studies we found were mostly about digital platforms that happened to be located in a developing country setting (i.e., India) but with little or no connection to explicit developmental implications (but see exceptions such as Banker et al., 2011; Jha et al., 2016).

3.1 | Transaction platforms and development

In the literature we reviewed, transaction platforms were depicted as useful matchmaking tools or as objects to remove important frictions in the contexts that the studies took place, for example in terms of having access to relevant information (Ogutu et al., 2014), pricing (Arinloye et al., 2015) or connections to other relevant user groups (Moitra et al., 2018). The key question centred around whether value was created for the actual targeted users (usually those belonging to particular marginalised groups), whether there was an actual need for the targeted users to use the platform in question, and whether users were able to access the platform at all (e.g., Meneses et al., 2017; Zolkafli et al., 2017). The issues linked to access were particularly raised in the literature and explored the reasons behind it. Barriers such as technical constraints, lack of skills, affordability to devices or data and digital literacy were discussed (Asamoah, 2019; Grossman et al., 2018; Nganyanyuka et al., 2017; Sambasivan et al., 2015). As a result, a large number of the studies reviewed concentrated on platforms that relied on relatively basic technologies such as SMS (Ogutu et al., 2014), voice (Moitra et al., 2018) or simple websites (Verkijika & Wet, 2018) to guarantee access among the targeted users. Some papers also highlighted the importance of offline and alternatives technologies in order to reach the set objectives (Moitra et al., 2018; Walls et al., 2015). For example, in their study on community mobilisation in India, Moitra et al. (2018) remark on the role of simple voice-based technologies to effectively broaden access to poor and marginalised communities into the platform, obviating the need for users to have a data connection or a smartphone. If not properly understood, the chosen technologies may lead to exacerbating inequalities by favouring those who are able to use the technology or have other required skills such as being able to read.

The literature also raised the issue on who benefits from transaction platforms in the context of the global South. If, as the studies showed, the marginalised groups of society lacked the means to participate or access these platforms, those that are already privileged end up capturing most benefits (Breuer et al., 2018; Schwittay &

Braund, 2019). The papers highlighted the importance of developing and managing the platform in inclusive ways to account for the participation of otherwise marginalised groups. Example of these include those platforms sharing market information to farmers (e.g., Arinloye et al., 2015), or those monitoring changes in carbon stocks on smallholder farms who otherwise would face numerous governance problems when participating in centralised incentive programs to reward carbon storage (Mbile et al., 2015).

Another salient finding that emerged from the review was the fact that NGOs, development agencies or governments were the driving forces of several platforms instead of business (Mbile et al., 2015; Wenner et al., 2018). There were exceptions to this (Arinloye et al., 2015; Ogutu et al., 2014), including those that discussed platforms partly or entirely designed by private companies (Alampay & Cabotaje, 2016; Guo et al., 2018; Schwittay & Braund, 2019), some of them located in the global North (e.g., Hussain & Mostafa, 2016; Kamel, 2014). The notion of ecosystems as well as different governance models were implicitly present in many of the papers. For example, Breuer et al. (2018) discussed a case where a non-governmental organisation worked together with the public sector in setting up a citizen participation platform, noting the underlying power structures and their effects in the functioning and governance of the platform.

3.2 | Innovation platforms and development

There were fewer publications on innovation platforms than on transaction platforms. The decision to classify a paper as an innovation platform was based on the definition we explained on Section 2: we looked for aspects related to third-party innovation, tools and rules for developers to innovate and/or any generativity aspects being dealt within the study. In general, of the few we found, research on innovation platforms highlighted how the contextual factors such as cost of data and illiteracy might have an effect on the appropriation and use of resources to design local applications (e.g., Kapinga et al., 2019). Other studies discussed emerging challenges and local needs (Uwaoma & Mansingh, 2018), as well as the suitability of resources for the intended use in local contexts (e.g., Loudon, 2016). Noutat et al. (2016), for example, present an application built in Cameroon to access to pharmacy and drug resources. To address the local issue of lack of data connectivity, the authors show how the application is adapted to the context of pharmacies in Cameroon, developing a compatible technology that on works SMSs as well. With the exception of the case of the health information management innovation platform (DHIS2; e.g., Hewapathirana & Sahay, 2017), there was no literature that would address the deployment of innovation platforms for developmental purposes.

Like the literature on transaction platforms, the papers on innovation platforms usually did not build on common theoretical digital platform underpinnings (i.e., those presented in Section 2 earlier) but approached them as rather stable technical artefacts. In general, there was little direct referral to concepts such as boundary resources or platform governance, with exceptions such as Msiska and Nielsen (2018). Most often, these factors were implicitly present in the papers in terms of discussions on different ownership structures or the practical requirements put forward by the platforms (Loudon, 2016). An underlying theme that appeared was indeed how developers balanced between the technological resources provided by the innovation and that enabled them to build the applications they wanted, while making sure that their applications remained accessible for the targeted end users of those applications. There was emphasis towards applications and complements that would function on alternative interfaces, as noted earlier with the Cameroon case. We also found relevant work addressing, rather implicitly, how an innovation platform can take the form of a data platform to be used as a resource to enable other purposes; for example, by supporting data-driven decision making in education planning (Iyengar et al., 2016) or to track gender gaps in accessing and using digital mediums (Fatehkia et al., 2018). Regarding data platforms, we found some relevant work that highlights the importance of access in terms of broadband and devices as well as data quality and overall usage (Sambasivan et al., 2015). Data platforms also emphasised the role of public and non-profit organisations as providers and users of data (e.g., Iyengar et al., 2016; van Biljon et al., 2017).

There have been more substantial work around contextual factors in the global South, which provide their own specific requirements for innovation platforms. As noted, the utilisation of innovation platforms in the global South emerges not from establishing innovation platforms and their ownership but rather on building local applications and platform complements. One question that emerged is how suitable the boundary resources provided by the platform owner may be to the contexts, skills and needs that are prevalent in many places of the global South. These resources are often primarily designed for users in the global North and the contexts prevalent there. This highlights the point concerning the disadvantaged position of many places in the global South vis-à-vis to the global North as the historical technology trajectories tend to favour the latter (Loudon, 2016). This view shares similarities with the notion of techno-colonialism (Madianou, 2019), which states that many technologies function to strengthen the dependencies of developing countries from the more developed ones and as such exacerbate inequalities and power imbalances (Chipidza & Leidner, 2019). As a result, the requirement for flexibility that would allow the developers in the global South to better shape the technological resources to fulfil the local objectives and serve the local needs and desires (Hewapathirana & Sahay, 2017; Tully, 2015) is left wanting.

3.3 | Summary of the findings from the literature review

An important, common finding from the literature is the significance of context and the need for a given development setting to have the strong enough institutional as well as infrastructural bases (Arinloye et al., 2015; Nganyanyuka et al., 2017; Ogutu et al., 2014; Zolkafli et al., 2017). Both appear to be important constraints for the digital platforms to function and therefore embrace different development related goals, an issue that the African survey on platforms highlighted (David-West & Evans, 2015). Whether concerning transaction or innovation platforms, the research we reviewed explored ways in which the socio-political context had implications to the platforms' usage and functionalities. Issues such as having minimum digital capabilities and access to the platforms commonly appeared, as well as the role played by relevant institutions for putting the minimum infrastructure in place (whether financial, regulatory or other). We also found emerging work that noted the risk for these platforms to end up exacerbating further existing inequalities, instead of being able to deliver developmental benefits for all (e.g., Breuer et al., 2018; Schwittay & Braund, 2019). Table 4 captures the key developmental dimensions, types and functions of platforms and examples emerging from the literature review.

Our analysis of the literature suggested two underlying themes that digital platforms may afford for development, namely broadening access and removing market frictions. Regarding the first, digital platforms appear to offer opportunities to access services or products to people who otherwise might not have the means to. For instance, in terms of innovation (ability to create applications of various kinds and distribute those), communication and reporting issues (deployment of Ushahidi), banking (M-Pesa) or having access to new work opportunities (UpWork). While not disappearing, the barriers for access appeared to become lowered for the targeted users of the platforms and enabling them to achieve specific goals.

The second underlying theme we found was the ability to remove frictions. In addition to broadening access, digital platforms appear to have the potential to remove several transaction and market frictions. These were suggested especially relevant in various global South settings, where frictions in terms of transaction costs tend to be more common due to inefficient institutions, poor communication networks or inadequate infrastructure. Examples include transaction platforms that can verify the authenticity of products in medicine (mPedigree) or those that provide access to better farm produce and prices (Esoko). The capacity to broaden access and removing frictions, however, may not be understood as inherent properties of digital platforms. The literature suggested several occasions where platforms failed to take contextual factors into account and may have left target groups out of reach. In this sense, the developmental potential of these platforms does not materialize by their mere existence but depends also on factors such as their operating context, design as well as how they are managed.

TABLE 4 Main findings, developmental goals and issues in the literature reviewed

Development goals to which digital platforms contribute	Type of platform	Main contributions from the literature	Developmental issues raised	Examples in the literature
No poverty	Transaction: info access and marketplaces	Significant work in reduction of rural poverty, access to fairer and bigger markets, project funding, information sharing	Need for supporting infrastructures and institutions in place; digital and capabilities divides	Arinloye et al. (2015); Jha et al., (2016); Ogutu et al. (2014); Riggins and Weber (2017)
Global health access and quality	Transaction: matchmaking	Some work in generation of new information services and matchmaking patients with carers	Lack of public information and public health infrastructure, marginalised communities still lagging	Grossman et al. (2018)
	Innovation: generation of local innovations	Significant work in the last decade on HISP and the generation of local innovations	Better adaptability to local settings; managing unequal access and using alternative interfaces	Msiska and Nielsen (2018); Noutat et al. (2016); Uwaoma and Mansingh (2018)
Quality Education	Transaction: access to education services	Some work on how to increase access to education	Need to have digital skills in educational curriculums, access to quality information and education, also in rural areas	Walls et al., 2015
Gender equality and female empowerment	Transaction: access and matchmaking Innovation: co-creation and inclusion of underrepresented groups	Some work on role of women in society, new forms of employment in gig economy and participation, access to gender-specific data Some work on inclusive innovation and inclusive co-creation targeting women	Gender inequalities and gaps in terms of internet and mobile access as well as services provided via those mediums Lack of applications that take into account the specific gender characteristics and incorporate those into the design of the applications	Fatehkia et al. (2018) Kapinga et al. (2019)
Reduce inequalities within and among countries	Transaction: access to information, enabling participation of the marginalised groups	Some work on managing and resourcing the platform to guarantee equality Some work on digital divide and access to digital platforms	Lack of institutions; contextual factors challenging equality, data divides, technology favouring the already privileged	Breuer et al. (2018); Hussain and Mostafa (2016); Moitra et al. (2018); Sambasivan et al. (2015) Zolkafli et al. (2017)

(Continues)

TABLE 4 (Continued)

Development goals to which digital platforms contribute	Type of platform	Main contributions from the literature	Developmental issues raised	Examples in the literature
			Difficulties in engaging with and participating in public processes such as land use planning	
Strengthening governance and institutions	Transaction: info and access site, activist mapping	Significant work on removing frictions to collect and share the views of people (citizen participation); enabling voices to be heard	Gender divides, unequal access to platforms	Asamoah (2019); Meneses et al. (2017); Nganyanyuka et al. (2017); Schwittay and Braund (2019)
Financial inclusion	Transaction: matching donors with projects, access to funding	Some work on broadening access to financial services, banking the unbanked	Issues of inequal access to finance	Alampay and Cabotaje (2016); Wenner et al. (2018)
Decent work and economic growth	Transaction: access to employment	Some work on enabling access to employment (gig economy) via matchmaking Significant work on broadening access to markets (network effects)	Precarious settings for workers, lack of institutional support Aligning the business with the requirements put forward by the platform	Rangaswamy (2019) Gbadegeshin et al. (2019); Li et al. (2018)

Another finding from our review, compared to the management literature on digital platforms (Cusumano et al., 2019), was the presence of non-commercial actors leading the deployment of platforms in the global South. This may not be surprising, given the fact that the platforms surveyed in the literature frequently have developmental goals that were beyond making profit (i.e., better access to health). These goals are normally linked to the work of non-governmental organizations (NGOs), governments or international organisations, rather than business (Mbile et al., 2015; Wenner et al., 2018). Similarly, the criticism put forward towards the economic view of transaction platforms is especially valid in relation to the ICT4D literature. Here, groups participating in the platforms could rarely be classified as buyers or sellers but more in terms of users benefiting from services such as better access or information regarding health, education or political participation. Businesses, in turn, were not absent from the literature either. Some papers did note that there was a role for the private entities as well (Arinloye et al., 2015; Ogutu et al., 2014), or highlighted the role of social enterprises to create value with transaction platforms (Jha et al., 2016). In general, in cases where the papers did not contain a developmental objective per se but focused on digital platforms functioning in a given developing country context (Duffett, 2017; Linne, 2015; Tan et al., 2015), private companies were more present. Overall, because of the involvement of NGOs and the like, combined with the primary social concern being development instead of profit making, the literature revealed a somewhat different ecosystem to that of commercial contexts such as those in the global North.

Finally, a number of the publications we reviewed concentrated on platforms that were still in a nascent or idea stage without being fully developed (e.g., Mbile et al., 2015; Schreieck et al., 2017). This meant that typical platform challenges, such as how to solve the chicken and egg problem, were not yet approached. Because of the presence of social instead of commercial drivers in several cases, this meant that financial sustainability was raised as an issue; most often, platforms depended on institutional or donor-based funding, with no revenue or specific business models in place.

4 | RESEARCH QUESTIONS TO STUDY DIGITAL PLATFORMS FOR DEVELOPMENT

In what follows, we highlight specific research questions that we consider relevant – but not exhaustive – to conduct future research on digital platforms for development. We base our suggestions on findings from the literature review as well as the conceptual components we presented on Section 2.

4.1 | How to release the developmental potential of *innovation* platforms?

One of the main findings from the literature is the relative lack of studies on *innovation platforms* and their linkages with developmental outcomes. Innovation platforms require intensive and expensive resources to establish and operate. As we evidenced from the literature review, it is not surprising that most studies would focus on transaction rather than innovation platforms. The studies we classify as innovation platforms suggested important challenges that developers and users face when creating or using platform complements in their local contexts. For example, the use of somewhat more generic and simpler technological artefacts such as SMS or voice provided solutions for applications to thrive in local contexts.

There is, however, scope and opportunity to explore these issues in much more detail. That is, to examine, understand and explain how issues of flexibility and local adaptation may affect how third-party developers perform their work in a given developmental context, and in what ways users and their constraints are taken into consideration. For example, we still know very little about the following questions: are boundary resources deployed in the global North still effective to nurture and foster a local ecosystem of third-party innovators in Africa? How do local capabilities enable or constrain how DHIS2 applications are deployed in specific settings in the global South? How

do developers acquire capabilities to innovate? How inclusive are the processes underlying innovation platforms? What level of flexibility and openness is needed to best exploit third party innovations in Africa, Asia or Latin American? Answering questions like these do matter because it may help not only to theorize better how to exploit the developmental potential of innovation platforms, but also to inform practice.

Our typology may offer good tools to answer questions like these. The theoretical underpinnings of innovation platforms (e.g., Ghazawneh & Henfridsson, 2013; Tiwana, 2014) are valuable to extend current knowledge. An example of how to study the developmental potential of innovation platforms is presented in the realm of open government data – as we suggested earlier in the typology. New digital social innovation ventures based on open data promise to contribute to global development goals, such as economic growth, job creation, social and economic inclusion and access to public services such as healthcare. Open government data implementations can be understood as an innovation platform as governments depend on an ecosystem of third-party innovators who can build meaningful services to citizens or the government to generate value. In this context, Bonina and Eaton (2020) draw on boundary resource theory to study how to cultivate a vibrant ecosystem of open data innovators in Latin America. The authors compare and analyze three open government data initiatives in the cities of Buenos Aires, Mexico City and Montevideo to identify how platform governance evolves over time. The outcome of the analysis proposes a theoretical model that describes a set of tools and rules open data platform authorities can use to stimulate, support and grow both data suppliers and data re-users with an innovation focus.

The inclusive innovation lens (Heeks et al., 2013) may also provide a suitable framework to apply. In simple terms, this means paying attention to the processes or outcomes of the inclusion of groups within processes of innovation that would otherwise be marginalised. As noted earlier, we still know little about how different innovation processes may lead to better (or worse) developmental outcomes – being in the form of complementors to the platforms or processes to adapt and redesign the core of an innovation platform. Are inclusive innovation processes leading to a reduction of inequalities in access to digital platform applications? Do gender participation make a difference in the types of outcomes that are released? For example, only recently there has been some evidence on the role of gender for user generated innovation (Mendonça & Reis, 2020). Combining the theory of innovation platforms and inclusive innovation may certainly contribute to gain more knowledge about the multi-faceted components of innovation platforms for development.

4.2 | Do digital platforms help to create new institutions or to destroy them?

The framing on digital platforms that we offer and the evidence from the literature review suggest a clear theme about the important socio-technical factors affecting developmental contexts. More often than not, the lack of institutional bases and few or non-existent digital infrastructure appeared as a recurrent theme in the literature we examined. The global South often faces bigger challenges in both areas as well as greater variety in local customs when moving from one culture or society to another. The latter was exemplified in Africa, where customer behaviour changed from one geographical setting to another, compromising the success and scalability of indigenous transaction platforms (David-West & Evans, 2015). As a result, digital platforms require local adaptations that can be quite different in relation to the original purpose, design or operation. For example, Facebook's drive to make its platform more usable in low bandwidth areas meant changing its technical settings to fit local needs (Kandrot, 2015; Jackson, 2015).

Digital platforms therefore enter in specific contexts with a given institutionalisation – that is, the process where norms, patterns of activities and the social order as a whole becomes accepted and deployed within a particular society (Avgerou, 2002). At the same time, digital platforms can be viewed as aiming to change the current institutional settings and replacing rules and norms with new ones. In other words, platforms can be either challenging the prevailing institutional logics and replacing those, or alternatively they can set the basis for creating institutions in societal areas where there have not necessarily been any. The latter is claimed to happen more frequently in a developing

country context and has been referred to as filling institutional voids (Khanna & Palepu, 2010). There are various examples where digital platforms may contribute with the institutionalisation of new norms. The Ugandan marketplace application Kudu relies on the use of SMS to connect farmers with buyers. The backend technology of Kudu relies on a sophisticated matching algorithm to connect those two user groups. What Kudu affords to the sellers is better access to the buyers while also providing certain protection for them to sustain a fair price. Similarly, it enables buyers to reach sellers that might otherwise very difficult to do. As a whole, Kudu had first to adapt itself to the local settings and norms to operate; but once functioning, it enabled to remove market frictions, replacing old norms with new institutional settings (Ssekibuule et al., 2013). The institutionalisation of new norms and forms of practices can have both negative and positive impacts for development. For example, anecdotal evidence reveals that the taxi industry in Mexico lacks transparency in the tariffs they apply. A common example is the route to come in or out of Mexico City's airport. For the passengers, the entrance of Uber in the country meant getting certainty about prices as well as improvements in personal safety. From another institutional angle, however, the entrance of Uber in Mexico was challenged because it failed to comply with the country's legal requirements. The algorithmic management techniques that underlie the job quality control in the gig economy bring another example. Seen as a new form of gaining flexibility and autonomy compared to traditional informational control to workers (Rosenblat & Stark, 2016; Wood et al., 2019), these algorithmic management techniques come at the expense of eroding typical labour institutions, such as protection to workers from low pay, isolation or exhaustion.

While in general institutional factors were present in the studies we reviewed, mostly in the form of contextual factors, there is broader scope to include them in the studies of digital platforms (whether transaction or innovation) in the future. An institutional perspective, and in particular institutional logics (Berente & Yoo, 2011; Thornton & Ocasio, 1999) or institutional voids (Khanna & Palepu, 2010) may provide beneficial lenses. These can be adopted to investigate questions related to the way digital platforms may be creating, eroding or changing practices in a given setting. In addition to a political economy analysis in which digital platforms operate (i.e., Thelen, 2018), an assessment onto the role of the underlying ideologies (Avgerou & Bonina, 2020) of digital platforms, and the diverse stakeholders promoting or contesting them (Avgerou & Li, 2013), may be helpful avenues to uncover relevant institutional dynamics.

4.3 | Do transaction platforms exacerbate inequalities and exclusion?

The issue of digital platforms and their role in exacerbating inequalities was raised in several articles we reviewed in this article. Often this can occur as the required devices and skills to use a platform are likely to benefit the already advantaged groups over the more marginalised. Consistent with Toyama's (2011) view on technology as an amplifier, digital platforms may well contribute to amplify existing inequalities. Existing economic and technological divides, for example, mean that only few indigenous platforms or applications will expand successfully in the global South compared to the North. Friederici et al. (2020) illustrate this point in their comprehensive study of digital entrepreneurship in Africa. They show that the small size and scope of African markets and the relatively poor technological readiness result in WhatsApp, Facebook and apps provided by local telecoms operators dominating their national markets, at the expense of services provided by indigenous start-ups.

The gig economy offers another useful lesson to study inequalities and exclusion in digital platforms more broadly. In a review of employment impacts and standards of the gig economy in developing countries, Heeks (2017) notes that transaction labour platforms may offer incremental, short term impacts on workers' livelihoods, at the expense of chronic precarity and structural inequality. The sources of these structural inequalities come from various asymmetries, that are shifting costs and risks from employers to workers, as well as information and resources towards relatively more capable or privileged workers. Others suggest that the gig economy comes to be an extension and continuation of neoliberal forces that exacerbate gender and generational inequalities, for whom insecure and non-standard employment has become the norm (Churchill et al., 2019).

There is an opportunity for extensive future work in digital platforms and gender that could contribute to the gender and ICT4D research agenda more in general (Walsham, 2017). Despite some valuable studies (e.g., Fatehkia et al., 2018; Kapinga et al., 2019), gender equality and the role of digital platforms is still very incipient. Issues of access, skills and capabilities are important candidates to expand work in terms of inequalities and digital platforms.

Both information systems and ICT4D research is well equipped with frameworks to analyze and extend important questions arising from digital platforms and exclusion, or inequalities. An application of Sen's capabilities theory and its applications (Nussbaum, 2011; Sen, 1999) may be used to study gender, race or other demographic differences in the appropriation or use of a given platform. Critical theory is another suitable candidate to help uncover inequalities, exclusion or unbalance of power in future research on digital platforms for development. ICT4D scholars have already showed the value of critical theory to unpack how macro sociopolitical analyses may affect institutional as well as organisational or individual changes. Lin et al. (2015), for example, demonstrate the value of applying a post-colonial perspective to understand what went wrong on an ICT4D project in Taiwan that would otherwise looked successful if following a traditional, non-critical approach. Similarly, Avgerou and Bonina (2020) apply critical discourse analysis to uncover the pervasive power of ideologies at the macro level to shape the appropriation of e-government strategies in Mexico. Deepening our understanding on a wider spectrum of social exclusion, including differences in race, gender, ethnicity and emotions among others, remains a major area for future work in digital platforms and development.

4.4 | What are the platforms alternatives in the global South? What alternative forms of value do digital platforms create for development?

A fourth potential research topic relates to the large variety of stakeholders and developmental areas that matter for development. As with other areas of ICT4D, there is substantial presence of NGOs, public institutions, governments and developmental agencies in designing and operating digital platforms, particularly in the global South. An important area for future research has to do with identifying which key alternative stakeholders emerge, as well as what constellations of alternative values they may bring for development.

This does not mean the exclusion of private companies either as the governance models of these platforms can be mixtures of several ownership types, be those public, private or community-owned. In general, digital platforms literature within information systems tend to have a business-centric perspective (Kohli & Melville, 2019; Yoo et al., 2012), often addressed from the perspective of large, global multinational corporations operating in developed contexts. The social angle of digital platforms, however, remains underplayed, except for the few studies we found in the review.

The application of social entrepreneurship theory presents another big opportunity for future work. A view from the social entrepreneurship literature may be useful to map those stakeholders and constellations of values to fulfil, sustain and expand diverse developmental outcomes of digital platforms. Ushahidi, a non-profit tech company headquartered in Kenya, is a good example. It combines crowdsourcing, citizen journalism and geospatial information to drive social activism and public accountability. The key aspect of these social enterprises lies in the social value proposition and the adoption of a business oriented economic model that seeks to generate revenues. A social enterprise lens may uncover the tensions as well as opportunities of combining economic and social missions to achieve developmental goals (Bonina et al., 2020). The growing presence of Platform Cooperatives (https://platform.coop/), which rely on democratic decision-making and a shared ownership of the platform by workers and users, may make an excellent case study for assessing alternative forms of value and governance.

4.5 | What is the 'dark side' of platforms for development?

As the literature, we reviewed suggest, platforms may deliver a broad range of positive benefits for development. However, the negative consequences of digital technologies are far from absent and IS scholars have acknowledged the need to address them more proactively (Tarafdar et al., 2015a, 2015b; Walsham, 2017). Whilst the negative consequences of digital platforms have been considered to some extent in the global North (Cusumano et al., 2019), there is far more work to be done to explore the 'dark side' of platforms for development within the IS and ICT4D communities. There are at least three areas of interest to explore further. These concern the surveillance of citizens with a resultant loss of freedoms and discrimination, the concentration of power and the concomitant imposition of practices and standards, and the negative impact of platforms on the labour force.

Starting in 2010, social media platforms were seen in a positive light as they were facilitating the emergence of movements promoting democracy. Indeed, the crowds that supported the 'Arab Spring', a series of protests in the Arab world against autocratic regimes, were mobilised via social media platforms such as Facebook and Twitter (BBC, 2011). However, the tide has turned, so that governments have the potential to use platforms as a means of surveillance and control over citizens. For example, in the recent 'Black Lives Matter' protests in Philadelphia it was reported (Business Insider, 2020) that the US FBI were able to identify a protester accused of setting a police car on fire by following clues identified on Instagram, Etsy and LinkedIn. Governments may go further and develop their own platforms to enable surveillance of citizens and constrain behaviour, as may happen through the system of Social Credit (Kobie, 2019) that is being introduced in China. Furthermore, the data produced through the use of social media and the Surveillance Capitalism (Zuboff, 2015) that it enables, has the potential to affect the democratic process as demonstrated by the recent Cambridge Analytica scandal (Kleinman, 2018). But these negative effects go beyond governmental uses. Corporations may accentuate discrimination and exclusion of those already marginalised in society, with the use largely closed, ad opaque algorithms that exploit the data generated by digital platforms (O'Neil, 2016). Consequently, there is much scope to develop our understanding not just in terms of how platforms can impinge upon citizens privacy and freedoms, but also to understand how governance can be put in place to maintain people's rights, freedoms and equalities. Of interest is to understand how platform architecture can be developed to protect citizens and users more in general. For example: how to incorporate algorithmic transparency and decision-making accountability into digital platforms?

Run away positive network effects can lead to digital platforms having the potential to concentrate market power in 'Winner Takes All' markets (Cusumano et al., 2019). The effect of this is that monopolies can be created by global platforms that may lock out local platforms and prevent them from succeeding. Profits generated in one geography are then repatriated to a wealthier location. Concentration of power by the big tech platforms also calls for approaches that would tackle the new form of 'data colonialism', that is, the predatory extractive practices of historical colonialism with the quantification methods of computing (Couldry & Mejias, 2018). A number of approaches have been taken in order to counter this effect. One is to develop platforms that closely meet the needs of a local context. This is demonstrated in the case of the sharing platform Gojek in Indonesia (Kien & Raharso, 2017), which has established itself in a local market in the face of global competition. However, as Friederici et al. (2020) show in Africa, sorting out common market bottlenecks in the global South is far from easy and it may require the articulation of practices and interest of several stakeholders in an entrepreneurial network (Avgerou & Li, 2013). Another approach is for a government to erect barriers to entry in order to allow native platforms to succeed. In this way, it is claimed by some that the Chinese regulation of the internet in its territory (Coca, 2019) favours the use of local platforms over western platform providers. Comparatives studies could shed light on the effectives of these approaches in the future. For example: what policies may be more suitable to tackle the concentration of power of digital platforms in the global South? What local governance approaches may work better to allow for the expansion of indigenous platforms?

A third area of rising concern is around the growing gig economy platforms and their effects on workers. As already discussed in the third research question presented earlier, the most obvious concern here is how the platforms drive the 'gig economy' (Graham et al., 2020), which is estimated to employ up to 40 million workers in the global South alone (Heeks, 2019). The negative consequences of these platforms and gig working on individuals

encompass issues such as low pay, discrimination, unreasonable working hours, precarity, unfair dismissal and unsafe working conditions (Page-Tickell, 2020; Rosenblat & Stark, 2016; Wood et al., 2019). The potential negative effects of platforms on the labour force in the global South goes beyond the gig economy to include impacts on workers employed more formally by platform companies who have the task of moderating content on social platforms (Chen, 2014). The task of moderating content bears the additional hazard of the psychological harm (Newton, 2019) that might result after long term exposure to content that many think of as disturbing. There are still further dimensions for scholar to explore when considering the negative effects of platforms on the labour force in various dimensions of development.

4.6 | How can digital platforms for development be better categorised?

Our literature review reveals a lack of nuanced categorisation of platforms for development. While analytically very useful, the distinction of platforms as transaction or innovation may be too coarse and may not be sufficient to grasp the full picture of what digital platforms mean for development. Part of the problem in the field may be confusing understandings of the current categories of digital platforms (transaction and innovation), leading to incoherent analysis. For example, the category of innovation platform represents a particular architectural design of IT artefact. The essence here being a core architecture with a broad scope of modular functionality that is opened-up and becomes accessible to developers via interfaces (APIs). The developers then construct applications in the peripheral architecture using functionality accessed from the core. In this sense, the term 'innovation platform' is not to be confused with the notion of 'platform innovation' – the latter, encompassing a broader notion of innovation that can happen on any category of platform. It might therefore seem reasonable to ask, what is the scope of approaches to platform innovation in the developmental settings and how do they differ?

Uncertainty around the potentialities of the two types of platforms can further lead to confusion when looking a more complex structures of platform. Some platforms can appear to be what Cusumano et al. (2019) term a *hybrid* platform – that is a platform containing characteristics of both innovation and a transaction platform. For example, Facebook started off as an exchange platform offering a social media experience. Subsequently, it evolved to offer up capabilities to enable third parties to develop services (e.g., simple games) as web apps that can be accessed from the platform, and in this way took on characteristics of an innovation platform. On closer inspection it might be more accurate to think of such platforms evolving into composites or layers of different types of platforms. Our understanding of complex platforms may be made easier, when they are broken down into their constituent platform components, which can then be categorised and characterised. These components can then be understood on their individual terms, and the interactions between these components studied.

Our literature review uncovered numerous transaction platforms, a few innovation platforms and did not identify any hybrid or composite platforms. This paucity of innovation platforms and hybrid platforms is not entirely surprising. Innovation platforms and composite or hybrid platforms are architecturally complex and therefore costly to develop. Therefore, they largely originate from within wealthier and established tech companies, which are mainly situated in the Global North and China. While these complex platforms may be used to build and deploy services (including transaction platforms) in the South, there are few notable complex platforms yet that are indigenous to the south. In this way there are patterns of platform evolution that we see, from the Global North and China, that may become replicated in the South and may ultimately lead to the establishment of complex indigenous platforms in the South. While not necessarily being a rule, the pattern starts with the establishment of a transaction platform, which is relatively cheap to develop. The transaction platform is a success and scales rapidly due to network effects. The transaction platform is then augmented with additional services (some of which might be transaction platforms in their own right). With further success, the platform composite is then augmented and its broad functional capabilities opened up with the addition of an innovation platform. Beyond examples in the Global North such as Facebook, we see this pattern of evolution occurring with Chinese platform composites such as Alipay and WeChat. This is but one platform evolution route that may offer a possible path for more sophisticated platforms to emerge in the South,

and to some degree this is already happening with established platforms such as Mercado Libre starting to open for third party developers. Future research could explore these dynamics: how do platforms evolve in the global South in comparison to the global North?

Our review demonstrates how essential characteristics of the two basic platform categories have applications beyond commerce in broader social settings, such as sustainable development. While we argue they form a useful baseline within which to categorize platforms, they do not allow for much granularity. As our attempts in Section 2 show, it is possible to impose a top down sub-categorisation of platforms (e.g., social media, sharing economy, knowledge sharing, digital identity platforms and so on), but many of these labels are driven from our understanding of commercial platforms in the global North. Such an approach risks functioning as a colonialist knowledge device and may obscure and even hinder our understanding of platform related development issues. Our subsequent literature review indicates that it might be possible to identify a more granular and effective categorisation and sub-categorisation of platforms, that encompasses both a broader and more profound view on development. We call for further research that generates a clarity in the categorisation of platforms for development, which might lead to more sophisticated research, uncover a better understanding of the issues concerning platforms for development and potentially lead to better platform design for development.

5 | CONCLUDING REMARKS

In this article, we aimed to foster the significance and impact of digital platforms for development. As Cusumano et al. (2019) rightly point out, digital platforms have the potential for both good and evil. While digital platforms can make significant contributions to realising the SDGs, their positive outcomes cannot be taken for granted. As our review suggests, we are only starting to understand the dark side of platforms for development. Virtually none of the big platform companies of today have escaped government investigation, regulatory oversight or media scrutiny. Alphabet, Apple, Amazon and Facebook are facing legal, taxation or regulatory scrutiny in the USA and the EU. Uber has been banned or partially banned in several countries. Cities around the world are taking severe measures to prevent Airbnb to continue operating as they enact new regulations on vacation rentals. Google has recently announced it had made changes to its search algorithm to highlight original reporting, in part because of the complaints against their influence over the digital news industry. And we are only starting to see regulatory measures in the global South, some emulating what currently happens in the North, and others with their own localities.

We believe our paper makes two important contributions to information systems and ICT4D research regarding digital platforms for development. First, it provides a categorisation that differentiates between transaction and innovation platforms, and synthetize their key characteristics, the way they create and capture value, and the rules to govern or grow their ecosystem. While not new, this categorisation has not been applied in information systems research or development studies, as our literature review shows. As such, it contributes to the scoping of digital platforms in the field, an issue raised in information systems (de Reuver et al., 2018). Second, by bringing together the categorisation, its sociotechnical dimensions and linkages to developmental outcomes, and extant debates in ICT4D literature, we identify a series of research questions to advancing our understanding of digital platforms for development. We identify six: issues of greater flexibility and openness to enable innovation, the role of digital platforms to create or rather erode institutions with implications for developmental outcomes, issues of digital platforms as contributors to inequalities, new constellations of value, the dark side that digital platforms may hold for development, and a more nuanced platform categorisation for development. These questions may be intertwined and related. For example, the lack of institutions and infrastructure will influence how platforms allow for or disallow equality. Likewise, issues or surveillance and algorithmic transparency are related to alternative digital platforms models or institutional contexts. Overall, we aimed to provide the foundations to conduct meaningful research in digital platforms for development so future work can contribute to knowledge generation and offer specific directions for policy and practice. In doing so, we particularly encourage future studies that review and critique the categorisation of platforms for development.

We acknowledge that the digital platforms phenomena and its implications for development may have been raised in various industries, digital outlets that were out of the scope of our work. We also understand that fields other than IS or development studies have produced valuable work in relevant research work that were omitted from the initial list of journals we investigated. The use of keywords may have also limited relevant work within the outlets we do have included in the literature review. For example, there are several papers being written on Aadhaar in India or mPesa in Africa that have not taken a platforms perspective and therefore not included in the review. These are limitations of our method. Future studies could use content analysis or computational social science methods to undercover a more extensive view on the subject, relying on the analytical typology of digital platforms that we offer. In addition, future studies could focus on reviewing specific industries or applications, such as identity-enabled financial services, to uncover what characteristics of digital platforms could promote or hinder diverse perspectives of development.

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DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated during the current study.

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REFERENCES

Alaimo, C., Kallinikos, J., & Valderrama, E. (2020). Platforms as service ecosystems: Lessons from social media. *Journal of Information Technology*, *35*(1), 25–48. https://doi.org/10.1177/0268396219881462

Alampay, E. A., & Cabotaje, C. (2016). M-money as conduit for conditional cash transfers in The Philippines. *Information Technologies & International Development*, *12*(2), 1–12.

Arinloye, D.-D. A. A., Linnemann, A. R., Hagelaar, G., Coulibaly, O., & Omta, O. S. W. F. (2015). Taking profit from the growing use of Mobile phone in Benin: A contingent valuation approach for market and quality information access. *Information Technology for Development*, *21*(1), 44–66. https://doi.org/10.1080/02681102.2013.859117

Asamoah, K. (2019). E-governance in Africa's local governments: Do district assemblies in Ghana optimize the use of websites and social media? *The Electronic Journal of Information Systems in Developing Countries*, *85*(4), e12082. https://doi.org/10.1002/isd2.12082

Avgerou, C. (2002). *Information systems and global diversity*, Oxford: Oxford University Press.

Avgerou, C. (2017). Theoretical framing of ICT4D research. In J. Choudrie, M. S. Islam, F. Wahid, J. M. Bass, & J. E. Priyatma (Eds.), *Information and communication technologies for development* (pp. 10–23). Cham: Springer International Publishing.

Avgerou, C., & Bonina, C. (2020). Ideologies implicated in IT innovation in government: A critical discourse analysis of Mexico's international trade administration. *Information Systems Journal*, *30*(1), 70–95. https://doi.org/10.1111/isj.12245

Avgerou, C., & Li, B. (2013). Relational and institutional embeddedness of Web-enabled entrepreneurial networks: Case studies of netrepreneurs in China. *Information Systems Journal*, *23*(4), 329–350. https://doi.org/10.1111/isj.12012

Baldwin, C. Y., & Woodard, C. J. (2009). The architecture of platforms: A unified view. In A. Gawer (Ed.), *Platforms*. Markets and Innovation: Edward Elgar Publishing.

Banker, R. D., Mitra, S., Sambamurthy, V., & Mitra, S. (2011). The effects of digital trading platforms on commodity prices in agricultural supply chains. *MIS Quarterly*, *35*(3), 599–611. https://doi.org/10.2307/23042798

BBC Two. (2011). *How Facebook changed the world: The Arab spring [BBC iPlayer]*. Retrieve from https://www.bbc.co.uk/programmes/b014l2ck

Berente, N., & Yoo, Y. (2011). Institutional contradictions and loose coupling: Postimplementation of NASA's enterprise information system. *Information Systems Research*, *23*(2), 376–396. https://doi.org/10.1287/isre.1110.0373

Bonina, C., & Eaton, B. (2020). Cultivating open government data platform ecosystems through governance: Lessons from Buenos Aires, Mexico City and Montevideo. *Government Information Quarterly*, *37*(3), 101479. https://doi.org/10.1016/j.giq.2020.101479

Bonina, C., López-Berzosa, D., & Scarlata, M. (2020). Social, commercial, or both? An exploratory study of the identity orientation of digital social innovations. *Information Systems Journal*. https://doi.org/10.1111/isj.12290

Breuer, A., Blomenkemper, L., Kliesch, S., Salzer, F., Schädler, M., Schweinfurth, V., & Virchow, S. (2018). The potential of ICT-supported participatory communication interventions to challenge local power dynamics: Lessons from the case of Togo. *The Electronic Journal of Information Systems in Developing Countries*, *84*(3), e12026. https://doi.org/10.1002/isd2.12026

Bright, J. (2019, May 31). *Diving deep into Africa's blossoming tech scene*. Retrieved from https://social.techcrunch.com/2019/05/31/diving-deep-into-africas-blossoming-tech-scene/

Business Insider. (2020). *FBI used Instagram, Etsy, and LinkedIn to track down, arrest protester – Business Insider*. Retrieved from https://www.businessinsider.com/fbi-uses-instagram-etsy-linkedin-to-find-george-floyd-protester-2020-6?r=US&IR=T

Ceccagnoli, M., Forman, C., Huang, P., & Wu, D. J. (2012). Cocreation of value in a platform ecosystem: The case of enterprise software. *MIS Quarterly*, *36*(1), 263–290.

Chen, A. (2014). The laborers who keep dick pics and beheadings out of your Facebook feed. Wired. Retrieved from https://www.wired.com/2014/10/content-moderation/

Chipidza, W., & Leidner, D. (2019). A review of the ICT-enabled development literature: Towards a power parity theory of ICT4D. *The Journal of Strategic Information Systems*, *28*(2), 145–174. https://doi.org/10.1016/j.jsis.2019.01.002

Churchill, B., Ravn, S., & Craig, L. (2019). Gendered and generational inequalities in the gig economy era. *Journal of Sociology*, *55*(4), 627–636. https://doi.org/10.1177/1440783319893754

Coca, N. (2019). Perspective | China's digital protectionism puts the future of the global internet at risk. *Washington Post*. Retrieved from https://www.washingtonpost.com/outlook/2019/02/25/chinas-digital-protectionism-puts-future-global-internet-risk/

Constantinides, P., Henfridsson, O., & Parker, G. G. (2018). Introduction – Platforms and infrastructures in the digital age. *Information Systems Research*, *29*(2), 381–400. https://doi.org/10.1287/isre.2018.0794

Couldry, N., & Mejias, U. A. (2018). Data colonialism: Rethinking big data's relation to the contemporary subject. *Television & New Media.*, *20*, 336–349. https://doi.org/10.1177/1527476418796632

Cusumano, M. A., Gawer, A., & Yoffie, D. B. (2019). *The business of platforms: Strategy in the age of digital competition, innovation, and power*, New York: HarperBusiness.

David-West, O., & Evans, P. (2015). *The rise of African platforms: A regional survey*. The Center for Global Enterprise.

Dawes, S. S., Vidiasova, L., & Parkhimovich, O. (2016). Planning and designing open government data programs: An ecosystem approach. *Government Information Quarterly*, *33*(1), 15–27. https://doi.org/10.1016/j.giq.2016.01.003

de Reuver, M., Sørensen, C., & Basole, R. C. (2018). The digital platform: A research agenda. *Journal of Information Technology*, *33*(2), 124–135.

Diga, K., & May, J. (2016). The ICT ecosystem: The application, usefulness, and future of an evolving concept. *Information Technology for Development*, *22*(sup1), 1–6. https://doi.org/10.1080/02681102.2016.1168218

Dignan, L. (2019). *App economy expected to be $120 billion in 2019 as small screen leads digital transformation efforts*. ZDNet. Retrieved from https://www.zdnet.com/article/app-economy-expected-to-be-120-billion-in-2019-as-small-screen-leads-digital-transformation-efforts/

Donner, J. (2015). *After Access: Inclusion, Development, and a More Mobile Internet*, Boston, MA: MIT Press.

Duffett, R. G. (2017). Influence of Facebook commercial communications on generation Z's attitudes in South Africa. *The Electronic Journal of Information Systems in Developing Countries*, *81*(1), 1–22. https://doi.org/10.1002/j.1681-4835.2017.tb00600.x

Eaton, B., Elaluf-Calderwood, S., Sørensen, C., & Yoo, Y. (2015). Distributed tuning of boundary resources: The case of Apple's iOS service system. *MIS Quarterly*, *39*(1), 217–243.

Eisenmann, T., Parker, G., & Alstyne, M. V. (2008). *Opening Platforms: How, When and Why?* (SSRN scholarly paper ID 1264012). Social Science Research Network. Retrieved from https://papers.ssrn.com/abstract=1264012

Eisenmann, T., Parker, G., & Alstyne, M. V. (2011). Platform envelopment. *Strategic Management Journal*, *32*(12), 1270–1285. https://doi.org/10.1002/smj.935

Evans, D. S., & Schmalensee, R. (2016). *Matchmakers: The new economics of multisided platforms*, Boston, MA: Harvard Business Review Press.

Evans, P., & Gawer, A. (2016). *The rise of the platform enterprise: A global survey*. The Center for Global Enterprise.

Familia, B. (2020). Bolsa Familia CAIXA (Version 2.4.0) [Mobile application software]. Retrieved from https://apps.apple.com/br/app/bolsa-fam%C3%ADlia-caixa/id1036174679

Fatehkia, M., Kashyap, R., & Weber, I. (2018). Using Facebook ad data to track the global digital gender gap. *World Development*, *107*, 189–209. https://doi.org/10.1016/j.worlddev.2018.03.007

Faulkner, P., & Runde, J. (2011). The social, the material, and the ontology of non-material technological objects, *958*, 4–8.

Faulkner, P., & Runde, J. (2019). Theorizing the digital object. *MIS Quarterly*, *43*(4), 1279. https://doi.org/10.25300/MISQ/2019/13136

Friederici, N., Wahome, M., & Graham, M. (2020). *Digital entrepreneurship in Africa: How a continent is escaping Silicon Valley's long shadow*, Boston, MA: MIT Press.

Gawer, A. (Ed.). (2009). *Platforms, markets and innovation*, Cheltenham: Edward Elgar Publishing.

Gawer, A. (2014). Bridging differing perspectives on technological platforms: Toward an integrative framework. *Research Policy*, *43*(7), 1239–1249. https://doi.org/10.1016/j.respol.2014.03.006

Gawer, A., & Cusumano, M. (2008). How Companies Become Platform Leaders. *MIT Sloan Management Review*, *Winter*, 28–35.

Gbadegeshin, S. A., Oyelere, S. S., Olaleye, S. A., Sanusi, I. T., Ukpabi, D. C., Olawumi, O., & Adegbite, A. (2019). Application of information and communication technology for internationalization of Nigerian small- and medium-sized enterprises. *The Electronic Journal of Information Systems in Developing Countries*, *85*(1), e12059. https://doi.org/10.1002/isd2.12059

Gelb, A., & Clark, J. (2013). *Identification for development: The biometrics revolution - Working Paper 315* (Working Paper No. 315). Center for Global Development. Retrieved from https://www.cgdev.org/publication/identification-development-biometrics-revolution-working-paper-315

Ghazawneh, A., & Henfridsson, O. (2013). Balancing platform control and external contribution in third-party development: The boundary resources model. *Information Systems Journal*, *23*(2), 173–192. https://doi.org/10.1111/j.1365-2575.2012.00406.x

Graham, M., Woodcock, J., Heeks, R., Mungai, P., Van Belle, J.-P., du Toit, D., … Silberman, S. M. (2020). The Fairwork foundation: Strategies for improving platform work in a global context. *Geoforum*, *112*, 100–103. https://doi.org/10.1016/j.geoforum.2020.01.023

Grossman, G., Platas, M. R., & Rodden, J. (2018). Crowdsourcing accountability: ICT for service delivery. *World Development*, *112*, 74–87. https://doi.org/10.1016/j.worlddev.2018.07.001

Guo, S., Guo, X., Zhang, X., & Vogel, D. (2018). Doctor–patient relationship strength's impact in an online healthcare community. *Information Technology for Development*, *24*(2), 279–300. https://doi.org/10.1080/02681102.2017.1283287

Hagiu, A., & Wright, J. (2015). Multi-sided platforms. *International Journal of Industrial Organization*, *43*, 162–174. https://doi.org/10.1016/j.ijindorg.2015.03.003

Hanseth, O., & Lyytinen, K. (2016). Design theory for dynamic complexity in information infrastructures: The case of building internet. In L. P. Willcocks, C. Sauer, & M. C. Lacity (Eds.), *Enacting research methods in information systems* (Vol. 3, pp. 104–142). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-29272-4_4

Harrison, T. M., Pardo, T. A., & Cook, M. E. (2012). Creating open government ecosystems: A research and development agenda. *Future Internet*, *4*(4), 900–928. https://doi.org/10.3390/fi4040900

Hart, O. D., & Moore, J. (1990). Property rights and the nature of the firm. *Journal of Political Economy –Chicago*, *98*(6), 1119–1158. https://doi.org/10.1086/261729

Heeks, R. (2017). *Decent work and the digital gig economy: A developing country perspective on employment impacts and standards in online outsourcing, Crowdwork, etc*. University of Manchester Global Development Institute. Retrieved from https://www.gdi.manchester.ac.uk/research/publications/di/di-wp71/

Heeks, R. (2019). How many platform workers are there in the global south? ICTs for Development. Retrieved from https://ict4dblog.wordpress.com/2019/01/29/how-many-platform-workers-are-there-in-the-global-south/

Heeks, R., Amalia, M., Robert, K., & Shah, N. (2013). Inclusive Innovation: Definition, Conceptualisation And Future Research Priorities. *Development Informatics Working Paper Series*, *Paper No. 53*.

Helmond, A., Nieborg, D. B., & Vlist, F. N. v. d. (2019). Facebook's evolution: Development of a platform-as-infrastructure. *Internet Histories*, *3*(2), 123–146. https://doi.org/10.1080/24701475.2019.1593667

Hewapathirana, R., & Sahay, S. (2017). Open source adoption in health sector: Understanding the stakeholder relationships in a resource constrained setting. *The Electronic Journal of Information Systems in Developing Countries*, *81*(1), 1–21. https://doi.org/10.1002/j.1681-4835.2017.tb00593.x

Hildebrandt, N., Nyarko, Y., Romagnoli, G., & Soldani, E. (2020). *Price information, Inter-Village networks, and 'bargaining spillovers': Experimental evidence from Ghana*. Social Science Research Network. https://doi.org/10.2139/ssrn.3694558

Hussain, F., & Mostafa, M. (2016). Digital contradictions in Bangladesh: Encouragement and deterrence of citizen engagement via ICTs. *Information Technologies & International Development*, *12*(2), 47–61.

Iansiti, M., & Levien, R. (2004). *The keystone advantage: What the new dynamics of business ecosystems mean for strategy, innovation, and sustainability*, Boston, MA: Harvard Business Press.

Iyengar, R., Mahal, A. R., Aklilu, L., Sweetland, A., Karim, A., Shin, H., … Pokharel, P. (2016). The use of technology for large-scale education planning and decision-making. *Information Technology for Development*, *22*(3), 525–538. https://doi.org/10.1080/02681102.2014.940267

Jackson, J. (2015). How Facebook made mobile site faster for users with limited bandwidth. *Computerworld* Retrieved from https://www.computerworld.com/article/2960779/social-media/how-facebook-made-mobile-site-faster-for-users-with-limited-bandwidth.html

Jacobides, M., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, *39*(8), 2255–2276.

Jha, S. K., Pinsonneault, A., & Dubé, L. (2016). The evolution of an ICT platform-enabled ecosystem for poverty alleviation: The case of eKutir. *MIS Quarterly*, *40*(2), 431–445. https://doi.org/10.25300/MISQ/2016/40.2.08

Kamel, S. H. (2014). Egypt's ongoing uprising and the role of social media: Is there development? *Information Technology for Development*, *20*(1), 78–91. https://doi.org/10.1080/02681102.2013.8s948

Kandrot, E. (2015). The technology behind preview photos. *Facebook Code* Retrieved from https://code.fb.com/uncategorized/the-technology-behind-preview-photos/

Kapinga, A. F., Montero, C. S., & Mbise, E. R. (2019). Mobile marketing application for entrepreneurship development: Codesign with women entrepreneurs in Iringa, Tanzania. *The Electronic Journal of Information Systems in Developing Countries*, *85*(2), e12073. https://doi.org/10.1002/isd2.12073

Karhu, K., Gustafsson, R., & Lyytinen, K. (2018). Exploiting and defending open digital platforms with boundary resources: Android's five platform forks. *Information Systems Research*, *29*(2), 479–497. https://doi.org/10.1287/isre.2018.0786

Khanna, T., & Palepu, K. G. (2010). *Winning in emerging markets: A road map for strategy and execution*, Boston, MA: Harvard Business Review Press.

Kien, S. S., & Raharso, A. P. (2017). *Go-Jek in Indonesia: Seizing digital opportunities at the bottom of the pyramid*, Singapore: The Asian Business Case Centre Retrieved from https://www.thecasecentre.org/main/products/view?&id=147972

Kleinman, Z. (2018). Cambridge Analytica: The story so far – BBC news. *BBC*. Retrieved from https://www.bbc.com/news/technology-43465968

Kobie, N. (2019). The complicated truth about China's social credit system. Wired UK. Retrieved from https://www.wired.co.uk/article/china-social-credit-system-explained

Kohli, R., & Melville, N. P. (2019). Digital innovation: A review and synthesis. *Information Systems Journal*, *29*, 200–223. https://doi.org/10.1111/isj.12193

Larios-Hernández, G. J., & Reyes-Mercado, P. (2018). Market influencers for ICT advancement in small states – A comparative analysis. *Information Technology for Development*, *24*(3), 612–631. https://doi.org/10.1080/02681102.2018.1446412

Li, L., Su, F., Zhang, W., & Mao, J.-Y. (2018). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal*, *28*(6), 1129–1157. https://doi.org/10.1111/isj.12153

Lin, C. I. C., Kuo, F.-Y., & Myers, M. D. (2015). Extending ict4d studies: The value of critical research. *MIS Quarterly*, *39*(3), 697–712. https://doi.org/10.25300/MISQ/2015/39.3.09

Linne, J. (2015). "Multimacy": Performances of intimacy on Facebook by Buenos Aires adolescents. *The Electronic Journal of Information Systems in Developing Countries*, *71*(1), 1–13. https://doi.org/10.1002/j.1681-4835.2015.tb00513.x

Loudon, M. (2016). A platform studies approach to the role of technology in the ICTD ecosystem: The SMS in m4d interventions. *Information Technology for Development*, *22*(Suppl. 1), 7–25. https://doi.org/10.1080/02681102.2015.1121858

Ly, P., & Mason, G. (2012). Competition between microfinance NGOs: Evidence from Kiva. *World Development*, *40*(3), 643–655. https://doi.org/10.1016/j.worlddev.2011.09.009

Madianou, M. (2019). Technocolonialism: Digital innovation and data practices in the humanitarian response to refugee crises. *Social Media + Society*, *5*(3), 205630511986314. https://doi.org/10.1177/2056305119863146

Mansell, R. (2001). Digital opportunities and the missing link for developing countries. *Oxford Review of Economic Policy*, *17*(2), 282–295. https://doi.org/10.1093/oxrep/17.2.282

Mbile, P., Makansi, A., Ajayi, O., Ferguson, C., Manzinga, A., & Ebokely, M. (2015). Monitoring carbon stocks on smallholder farms using information and communications technologies: Evaluating the potential for Central Africa. *The Electronic Journal of Information Systems in Developing Countries*, *71*(1), 1–17. https://doi.org/10.1002/j.1681-4835.2015.tb00512.x

Mendonça, J., & Reis, A. (2020). Exploring the mechanisms of gender effects in user innovation. *Technological Forecasting and Social Change*, *155*, 119988. https://doi.org/10.1016/j.techfore.2020.119988

Meneses, M. E., Nonnecke, B., del Campo, A. M., Krishnan, S., Patel, J., Kim, M., … Goldberg, K. (2017). Overcoming citizen mistrust and enhancing democratic practices: Results from the E-participation platform México Participa. *Information Technologies & International Development*, *13*(0), 17.

Mir, U. B., Kar, A. K., Dwivedi, Y. K., Gupta, M. P., & Sharma, R. S. (2020). Realizing digital identity in government: Prioritizing design and implementation objectives for Aadhaar in India. *Government Information Quarterly*, *37*(2), 101442. https://doi.org/10.1016/j.giq.2019.101442

Moitra, A., Kumar, A., & Seth, A. (2018). An analysis of community mobilization strategies of a voice-based community media platform in rural India. *Information Technologies & International Development*, *14*(0), 18.

Moore, J. F. (1993). Predators and prey: A new ecology of competition. *Harvard Business Review*, *71*(3), 75–86.

Msiska, B., & Nielsen, P. (2018). Innovation in the fringes of software ecosystems: The role of socio-technical generativity. *Information Technology for Development*, *24*(2), 398–421. https://doi.org/10.1080/02681102.2017.1400939

Newton, C. (2019, June 19). Three Facebook moderators break their NDAs to expose a company in crisis. *The Verge*. Retrieved from https://www.theverge.com/2019/6/19/18681845/facebook-moderator-interviews-video-trauma-ptsd-cognizant-tampa

Nganyanyuka, K., Martinez, J., Lungo, J., Verplanke, J., & Georgiadou, Y. (2017). Working with the grain: How amenable to digital transformation are the monitoring and repair of rural water points in Tanzania? *Information Technologies & International Development*, *13*, 19.

Nguyen, S. P., & Mahundi, M. H. (2019). The dynamics of national ICT ecosystems. *The Electronic Journal of Information Systems in Developing Countries*, *85*(1), e12058. https://doi.org/10.1002/isd2.12058

Nguyen, S. P., Nielsen, P., & Sæbø, J. I. (2017). The role of global standardization communities in shaping national health information architectures. In J. Choudrie, M. S. Islam, F. Wahid, J. M. Bass, & J. E. Priyatma (Eds.), *Information and communication technologies for development* (pp. 93–103). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-59111-7_9

Nicholson, B., Nugroho, Y., & Rangaswamy, N. (2016). Social media for development: outlining debates, theory and praxis. *Information Technology for Development*, *22*(3), 357–363.

Nielsen, P. (2017). Digital innovation: A research agenda for information systems research in developing countries. In J. Choudrie, M. S. Islam, F. Wahid, J. M. Bass, & J. E. Priyatma (Eds.), *Information and communication technologies for development* (pp. 269–279). Cham: Springer International Publishing.

Nielsen, P., & Kimaro, H. C. (Eds.). (2019). Information and communication Technologies for Development. Strengthening southern-driven cooperation as a catalyst for ICT4D: 15th IFIP WG 9.4 international conference on social implications of computers in developing countries, ICT4D 2019, Dar Es Salaam, Tanzania, May 1–3, 2019, proceedings, part I. Springer International Publishing. https://doi.org/10.1007/978-3-030-18400-1

Noutat, J. S. N., Ndie, T. D., & Tangha, C. (2016). Campharma: A mobile tool for interaction between pharmacies and patients in Cameroon. *The Electronic Journal of Information Systems in Developing Countries*, *76*(1), 1–10. https://doi.org/10.1002/j.1681-4835.2016.tb00556.x

Nussbaum, M. C. (2011). *Creating capabilities*, Boston, MA: Harvard University Press.

O'Neil, C. (2016). *Weapons of math destruction: How big data increases inequality and threatens democracy*, New York: Penguin Random House.

Ogutu, S. O., Okello, J. J., & Otieno, D. J. (2014). Impact of information and communication technology-based market information services on smallholder farm input use and productivity: The case of Kenya. *World Development*, *64*, 311–321. https://doi.org/10.1016/j.worlddev.2014.06.011

Page-Tickell, R. (2020). In E. Yerby (Ed.), *Conflict and shifting boundaries in the gig economy: An interdisciplinary analysis*, Bingley: Emerald Publishing.

Plantin, J.-C., Lagoze, C., Edwards, P. N., & Sandvig, C. (2018). Infrastructure studies meet platform studies in the age of Google and Facebook. *New Media & Society*, *20*(1), 293–310. https://doi.org/10.1177/1461444816661553

Rangaswamy, N. (2019). A note on informal economy and ICT. *The Electronic Journal of Information Systems in Developing Countries*, *85*(3), e12083. https://doi.org/10.1002/isd2.12083

Riggins, F. J., & Weber, D. M. (2017). Information asymmetries and identification bias in P2P social microlending. *Information Technology for Development*, *23*(1), 107–126. https://doi.org/10.1080/02681102.2016.1247345

Rosen, J. (2017). *Uganda's "Uber for motorcycles" focuses on safety*. *MIT Technology Review* Retrieved from https://www.technologyreview.com/2017/04/03/152808/ugandas-uber-for-motorcycles-focuses-on-safety/

Rosenblat, A., & Stark, L. (2016). Algorithmic labor and information asymmetries: A case study of Uber's drivers. *International Journal of Communication*, *10*(0), 27.

Sambasivan, N., Lee, P., Hecht, G., Aoki, P. M., Carrera, M.-I., Chen, J., … Larssen, A. T. (2015). SmartBrowse: Design and evaluation of a price transparency tool for mobile web use. *Information Technologies & International Development*, *11*(1), 21–40.

Schreieck, M., Wiesche, M., & Krcmar, H. (2017). Governing nonprofit platform ecosystems – An information platform for refugees. *Information Technology for Development*, *23*(3), 618–643. https://doi.org/10.1080/02681102.2017.1335280

Schwittay, A., & Braund, P. (2019). Participation 2.0? Crowdsourcing participatory development @ DFID. *Information Technologies & International Development*, *15*(0), 15.

Sen, A. (1999). *Development as freedom*, Oxford: Oxford University Press.

Ssekibuule, R., Quinn, J. A., & Leyton-Brown, K. (2013). A Mobile market for agricultural trade in Uganda. *Proceedings of the 4th Annual Symposium on Computing for* Development, pp. 1–10

Tan, B., Pan, S., Lu, X., & Huang, L. (2015). The role of IS capabilities in the development of multi-sided platforms: The digital ecosystem strategy of Alibaba.com. *Journal of the Association for Information Systems*, *16*(4), 248–280. https://doi.org/10.17705/1jais.00393

Tarafdar, M., Gupta, A., & Turel, O. (2015a). Introduction to the special issue on 'dark side of information technology use' – Part two. *Information Systems Journal*, *25*(4), 315–317. https://doi.org/10.1111/isj.12076

Tarafdar, M., Gupta, A., & Turel, O. (2015b). Special issue on 'dark side of information technology use': An introduction and a framework for research. *Information Systems Journal*, *25*(3), 161–170. https://doi.org/10.1111/isj.12070

Thelen, K. (2018). Regulating Uber: The politics of the platform economy in Europe and the United States. *Perspectives on Politics*, *16*(4), 938–953. https://doi.org/10.1017/S1537592718001081

Thornton, P. H., & Ocasio, W. (1999). Institutional logics and the historical contingency of power in organizations: Executive succession in the higher education publishing industry, 1958-1990. *American Journal of Sociology*, *105*(3), 801–843.

Tiwana, A. (2014). *Platform ecosystems: Aligning architecture, governance, and strategy*, Waltham, MA: Seattle, WA, Morgan Kaufmann.

Toyama, K. (2011). Technology as amplifier in international development. Proceedings of the 2011 IConference, Seattle, WA. pp. 75–82. https://doi.org/10.1145/1940761.1940772

Tully, M. (2015). Investigating the role of innovation attributes in the adoption, rejection, and discontinued use of open source software for development. *Information Technologies & International Development*, *11*(3), 55–69.

Ulrich, K. (1995). The role of product architecture in the manufacturing firm. *Research Policy*, *24*(3), 419–440.

UNCTAD. (2019). *Digital economy report 2019*. *Value creation and capture: Implications for developing countries* (p. 172). Geneva: United Nations Conference on Trade and Development (UNCTAD).

UNDP (2001). *Human Development Report 2001—Making New Technologies Work for Human Development*, New York: United Nations Development Programme. http://hdr.undp.org/en/content/human-development-report-2001.

United Nations. (2020). *The United Nations E-government survey 2020*. New York: United Nations.

Uwaoma, C., & Mansingh, G. (2018). Proposing a decision support system for automated mobile asthma monitoring in remote areas. *Information Technology for Development*, *24*(2), 301–314. https://doi.org/10.1080/02681102.2017.1310712

van Biljon, J., Marais, M., & Platz, M. (2017). Digital platforms for research collaboration: Using design science in developing a South African open knowledge repository. *Information Technology for Development*, *23*(3), 463–485. https://doi.org/10.1080/02681102.2017.1328654

Verkijika, S. F., & Wet, L. D. (2018). Quality assessment of e-government websites in sub-Saharan Africa: A public values perspective. *The Electronic Journal of Information Systems in Developing Countries*, *84*(2), e12015. https://doi.org/10.1002/isd2.12015

Walls, E., Santer, M., Wills, G., & Vass, J. (2015). The dreams plan: A Blupoint strategy for e-education provision in South Africa. *The Electronic Journal of Information Systems in Developing Countries*, *70*(1), 1–24. https://doi.org/10.1002/j.1681-4835.2015.tb00507.x

Walsham, G. (2017). ICT4D research: Reflections on history and future agenda. *Information Technology for Development*, *23*, 18–41. https://doi.org/10.1080/02681102.2016.1246406

Wareham, J., Fox, P. B., & Cano Giner, J. L. (2014). Technology ecosystem governance. *Organization Science*, *25*(4), 1195–1215. https://doi.org/10.1287/orsc.2014.0895

Wenner, G., Bram, J. T., Marino, M., Obeysekare, E., & Mehta, K. (2018). Organizational models of mobile payment systems in low-resource environments. *Information Technology for Development*, *24*(4), 681–705. https://doi.org/10.1080/02681102.2017.1311830

Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. (2019). Good gig, bad gig: Autonomy and algorithmic control in the global gig economy. *Work, Employment and Society*, *33*(1), 56–75. https://doi.org/10.1177/0950017018785616

World Bank. (2018, September 21). *Disrupting development: Digital platforms and innovation*. World Bank Live Retrieved from https://live.worldbank.org/disrupting-development

Yoo, Y., Boland, R. J., Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization Science*, *23*(5), 1398–1408. https://doi.org/10.1287/orsc.1120.0771

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research commentary – The new organizing logic of digital innovation: An agenda for information systems research. *Information Systems Research*, *21*(4), 724–735.

Zheng, Y., Hatakka, M., Sahay, S., & Andersson, A. (2018). Conceptualizing development in information and communication technology for development (ICT4D). *Information Technology for Development*, *24*(1), 1–14. https://doi.org/10.1080/02681102.2017.1396020

Zittrain, J. L. (2008). *The future of the internet and how to stop it*, New Haven and London: Yale University Press.

Zolkafli, A., Brown, G., & Liu, Y. (2017). An evaluation of participatory GIS (PGIS) for land use planning in Malaysia. *The Electronic Journal of Information Systems in Developing Countries*, *83*(1), 1–23. https://doi.org/10.1002/j.1681-4835.2017.tb00610.x

Zuboff, S. (2015). Big other: Surveillance capitalism and the prospects of an information civilization. *Journal of Information Technology*, *30*(1), 75–89. https://doi.org/10.1057/jit.2015.5

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