Value creation in the 4IR

Millennials and Digital Multisided Platforms (MSPs)

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Abstract

Value creation in the 4IR is customer-centric, interactive and hyper-personalised. Real-time consumer brand experiences, interactions and relations can be transformed into quantifiable data that can be monitored and tracked ('datafication'). This study theorises that platform ecosystems, including millennials, converge on digital multisided platforms (MSPs), which are sociotechnical constructs that foment and generate significant value for platform owners and users. As value creation has risen as a digital economy business imperative, and a subject for academic research, the importance of millennials to brands warrants further investigation. This study aims to show how the interplay of social relations between millennials and brands, along with technology, are used to create value from the millennials' perspective. To this end, it uses a consumer-dominant logic to explain and predict novel connections between key value creation constructs by millennial prosumers, including sole-creation, co-creation, collaboration, value destruction, value depreciation and value co-destruction. It presents three propositions that reimagine fit-for-purpose brands as interoperable constructs which exhibit complementarity, as well as the social dynamics of millennial interaction on digital MSPs. Findings indicate a cyclical value-interdependent relational system between millennials and brands, where millennial interaction leads to the creation or destruction of value. It also demonstrates how brands and platform owners can collaborate with millennials as an important and technologically savvy generation to co-create, capture and communicate value on digital MSPs.

Keywords: Consumer-dominant logic, customer experience, digital multisided platforms, millennials, brands, value creation

1. Introduction

Since the emergence of the digital economy, brands have found themselves navigating exponential disruptions that necessitate a rethink of assumptions about the nature of their business, consumers, and value creation. The Fourth Industrial Revolution (4IR) is value-creating and customer-centric. Value is created from the interactions, relationships and integration of systems inside and outside of brands. Therefore, 'the locus of value creation moves from inside the brand to outside' (Parker, Van Alstyne and Jiang 2017: 255), and primarily occurs on digital multisided platforms (MSPs). Digital MSPs are defined as digital technologies and market mechanisms that rely on the massive interactions of key actors for their survival. They are digitally distributed systems (components that communicate with each other in order to achieve a goal), and are decomposable into components (interdependent

consumers). Digital MSPs are also sociotechnical constructs that generate significant value for platform owners and users. The sociotechnical concept represents the complex interactions between people, technology and brands (Kapoor et al 2021). Prominent digital MSPs include Jumia, Naspers, Apple and Amazon.

Since 2015, Apple, Google and Microsoft have been among the world's most valuable brands, known for their developer ecosystems. Ecosystems are distinctive features of digital platforms (Parker, Van Alstyne and Jiang 2017) and interdependent networks of firms that collaborate, compete and benefit from value creation (Kapoor et al 2021). For that reason, a digital platform is a fundamental structure underlying a system of both social and marketplace interactions (Glimsteddt 2017) for the creation of value in an ecosystem.

Brands and consumers can initiate the process of value creation in an ecosystem. Value creation can begin with the brand and end up with consumers, and vice versa. Value creation ends only when it is appropriated. In the era of 4IR, value appropriation can feed back into value creation, and the process starts all over again, thereby initiating a circular flow of value creation.

Digitally empowered millennials have the finances, devices and digital skills for constant connection on digital MSPs. The millennial cohort is connected through the formation of social bonds amplified by their massive presence on various digital MSPs and signifies the importance they attach to digital interactions. Their digital presence makes them a unique block of interdependent (co-dependent) consumers. Consequently, millennials' vast presence on various digital MSPs underpins the platform's existence, and plays a dominant role in the digital economy.

Prior studies of value creation on digital MSPs focus on competition (Casadesus-Masanell and Zhu 2013), strategy (Subramaniam 2020), network effects (Staykova and Damsgaard 2015), and co-creation (Karippacheril et al 2013), to name a few. Furthermore, sociotechnical research tends to focus on technology and neglects the social aspects of platform ecosystems (Kapoor et al 2021). Researchers still need to investigate markets as platforms where individuals exchange goods and services, interact, build relationships, and create value for themselves and other key actors (Gallagher, Mastrogiorgio & Petracca 2019). Gaps still exist about how the digital interactions of South African millennial prosumers create value on digital MSPs from a platform-agnostic and consumer-dominant logic. The framework set out in this study seeks to address this gap in our knowledge.

Before presenting the framework designed to explain how millennial interaction on digital MSPs creates value for their cohort and brands, I will discuss digital MSPs and the connections and types of dependencies exhibited in platform ecosystems. I will then examine 4IR-related interoperability and complementarity, before turning to millennials as prosumers.

2. Digital Multisided Platforms (MSPs)

The sociotechnical aspects of digital MSPs are expressed as the merger of social interaction with technology that accelerates the pace of human interaction with digital technologies. This has greatly increased the rate at which human beings and automated systems create, communicate, share, and store information and content of all categories across time and space (Couldry et al 2018). The value creation, delivery and capture mechanisms of digital MSPs (Teece 2018) highlight the logic of these interactions.

Some interactional activities include payments, online marketplaces, communication, social media, financial exchanges, creative content outlets, advertising-supported media, app stores, operating systems, price comparison websites, search engines, and collaboration and sharing platforms (Evans & Schmalensee 2017). These platforms continue to expand consumer choice, civil participation, and the efficiency and competitiveness of industries (OECD 2018).

The principle of a digital MSP is that the viability of one side of the market makes the other side attractive for interactions and value creation. Platform viability depends on achieving a critical mass of members on both sides to create enough value to attract more members on each side (Evans 2017). Fundamentally, participants in these platforms need each other, and strive to create value for each other. Value creation, therefore, becomes the defining goal of digital MSP business models and strategies which centre on how to create, communicate and capture value. The propositions and suppositions underpinning this framework are set out in the following sections.

2.1 Connection and interconnection, dependence and interdependence on digital MSPs

Digital MSPs are digitally distributed systems that can be separated into components. These components consist of interdependent consumers who are connected and interconnected and engage in interactions by forming social relations that result in component networks. Therefore, a component network refers to key actors connected and interconnected within a system and between systems in a relationship (Ramaswamy & Kerimcan 2018).

Connection is the relationship or link within a component of a system. Interconnection refers to the mutual connection or relations between two or more components of a system. Interconnection in social relations is a mechanism where interdependent (components) consumers interact to create and co-create value for themselves.

An interconnection in network systems transports and delivers information from one element to another, while interconnections in social relations facilitate interaction and the creation and delivery of value between key actors. The interconnections between the system networks and social relations bring about dependencies and interdependencies.

Dependence (one-sided reliance) and interdependence (mutual reliance) imply some sort of correspondence of interests among the key actors. In such a scenario, what happens in one system, directly and indirectly, affects other systems that connect and interconnect. For instance, a power outage in one system can affect the other interconnected systems. The interconnections of digital modules enable communication devices at the one end to communicate or share value with another at the other.

Analogously, the interconnections of interdependent consumers allow the sharing of value created on one side with the other side of the platform. For example, trusted devices like the subscriber identity module (SIM) card interconnect or matchmake devices like smartphones and a network. This is similar to the way in which digital intermediaries treat interdependent consumers on the different sides of digital MSPs by matchmaking and enabling interactions between them. The interconnection between the sides of a platform increase collaboration, data sharing and interaction. Accordingly, value creation and flows are characterised by the dependence and interdependence, connections and interconnections of components and sides of digital MSPs. This leads us to the following proposition:

Proposition #1: A state of dependence on digital MSPs exists when the value creation competence of a key actor relies on the action or inaction of a second key actor.

Failure to support or receive help from the second key actor it is connected to impedes the value creation capabilities of the first key actor. Simply put, the outcome (success or failure) of any value creation effort of a key actor relies solely on the assistance, help and support (actions/inactions) received from the second key actor connected with it. Dependence can be a nexus of unidirectional and bidirectional connections. In terms of communication networks, 'sources utilise symbolic systems to encode messages and deliver them to receivers, and receivers acquire information by decoding the received messages' (Oh & Monge, 2016). In particular, the direction of value is from point to point in a communication network.

However, most dependent relations that are unidirectional are one-sided dominant communication patterns. Information flow is at the dictate of the source, and only sounds logical in one direction. We can have one-to-one, one-to-many, many-to-one, and many-to-many unidirectional relations. One-to-many unidirectional relations, for instance, could be a corporate brand with many subsidiaries or branches. These subsidiaries are controlled and linked with the corporate headquarters of the parent company in question, but none of those subsidiaries can be controlled by or share links with other independent companies.

In addition, there can be mutually dependent bidirectional connections on digital MSPs, consisting of reciprocal, asymmetric and symmetric interactions between key actors on one side of a digital MSP. In terms of interpersonal communication, interaction is dialogic, involving at least two key actors exchanging data, information or value that are beneficial to each other or have damaging effects on both parties. Thus value creation is a mutually dependent relation when key actors are bi-directionally connected and create and exchange value asymmetrically and symmetrically. Relying on this supposition, we arrive at our second proposition:

Proposition #2: Interdependence relations exist when all the key actors are interconnected and mutually dependent on one another during value creation on a digital MSP.

Interdependence on digital MSPs is defined by how interconnected, mutually related and intertwined key actors are on both sides of the platform. Data, influence, information, messages and value can flow from one side of the platform to the other, and start concurrently (Khamfroush et al 2019). Hence, digital platforms serve to convey meaningful value by facilitating the interconnection of products and services with the flow of data between key actors (Ruutu, Casey & Kotovirta 2017).

Interdependence relations on digital MSP are bi-directionally connected, and are only valid in two directions. For example, there can be one-to-one, one-to-many, many-to-one, and many-to-many bidirectional relationships in an interdependent relation or network. Such a relationship can exist between consumers, or between consumers and products or services. Moreover, the actions of key actors can bi-directionally affect one another positively or negatively (Agostinho & Jardim-Goncalves 2015).

Furthermore, the outcome (success/failure) of the value creation efforts of key actors who are interdependent consumers on one side of the system depends on the value creation activities (success/failure) of the key actors on the other side when they are cooperating. but are inversely related when they are competing against each other. When the sides collaborate, they will all succeed, and vice versa. When they compete, the winner takes all. Therefore,

competition in interdependent relations can create asymmetric networks where one actor dominates. Additionally, in a value creation process where the interdependent consumers cooperate, the behaviours of key actors can create a feedback loop. Hence, the actions of one or many sides can ignite responses and reactions, which can cause a reflexive impact that feeds back into the system. Consequently, our third proposition is as follows:

Proposition #3: Key actors can be independently connected and create value autonomously on digital MSPs.

Independence refers to a situation where the value created by key actors is unaffected by the actions and inactions of other key actors. This implies that some interdependent consumers are autonomous agents who do not rely on the other side of the platform. Accordingly, the value created on one side unaffected by the activities taking place on the others. Consequently, autonomy is defined as the lack of causal connections between components in a system that do not depend on the value creation abilities of each other for survival. At the individual level, it means that the interaction leading up to the creation of value is generated by individual efforts, without any form of cooperation.

To summarise, the three propositions illustrate that value can be created and co-created by key actors within and among component units of a system through a process of interaction. Digital MSPs are thus the domains of interaction between interdependent consumers, or between autonomous key actors.

2.2 Platform ecosystem

An ecosystem is an element of interlinkages and interdependencies (Subramaniam 2020) of social relations. It is a network formed by the connections and interconnections, dependence and interdependence, and relations of the modular architecture of a distributed system (digital MSPs). A modular architecture encompasses the autonomous agents, components, elements, or modules that are connected and interconnected in a network. Modules or components can be created independently, connected, and replaced without upsetting the entire system. Modularity lowers the costs of redesigning, linking and merging components in networks (Kiesling 2021). These networks can be machine-to-machine networks (computer networks, telecommunications networks, the internet), a network of things (railway networks, road networks, geospatial networks), social networks (networks of individuals, networks of business and people, socio-political networks), or economic networks (global logistics supply networks, international bilateral agreements, transnational credit, and foreign direct investments) (Caschili, Medda & Wilson 2015) constituting an ecosystem of interacting elements.

Notably, the key actors that constitute the components in an ecosystem are united or held together by their interactions. This common unity (community) formed from interactions between components in the network creates value. Each interacting actor benefits from the social relations existing within the community of an ecosystem.

On digital MSPs, diverse kinds of value are produced in different types of ecosystems. The creation and co-creation of meaningful value in an ecosystem often involves prolonged and repeated interactions on the online and offline continuum. In order to manage and continue the creation of benefits in a dynamic ecosystem, components of the networks frequently alter. The key actors that constitute the components enter and leave the system. The rate at which they enter or exit, namely churn, can also be high or low. These social dynamics taking place within the system either aid robustness or worsen fragility, resulting in system failure.

Additionally, the robustness and resilience of an ecosystem strengthen the tendency to create and co-create value on the digital MSP (Hein et al 2020). In contrast, frailty in an ecosystem may lead to the insubstantial creation and co-creation of value within and between components of a digital MSP. Furthermore, on digital MSPs, the components are the sides added in stages to enhance and facilitate interactivity, interdependence and interconnectivity. In particular, a digital MSP ecosystem constitutes the building of digital infrastructure for interaction and exchange of value, which does not require much ownership of physical assets or physical systems. As interaction is the backbone for forming an ecosystem, participants place a premium on the level of adoption by other participants. When more actors adopt a platform, it becomes more viable.

Related to the above, components of digital MSP are interdependent consumers. It is the convergence and interaction of the interdependent consumers to create value on digital MSPs that form an ecosystem. Interdependent consumers interact on their own side and with other sides of digital MSPs. The extent of these interactions within and between components of digital MSPs is rising exponentially as a result of the merger of 4IR technologies and social interaction (Ardolino et al 2020). The components of digital MSP are dynamically aligned through the process of coupling (Isckia, De Reuver & Lescop 2020), resulting from interactions.

Moreover, the coupling and dependencies within components are regarded as interactions within, whereas couplings and dependencies between components are considered as interactions across. The degree of coupling and dependence within and across components depends on how connected and interconnected key actors are on digital MSPs. Therefore, coupling and dependence can be viewed as the degree of fit or strength of connectedness between key actors during the interaction process, or the degree of compatibility between the interacting components of key actors in a system. Technically, components are created through scalability. Scalability is the ability to change the size and scope of a corporate brand in terms of efficiency and performance. This capacity can be on vertical and horizontal scales (Tiwana 2014), responding to the changing demands in an agile and dynamic business environment.

Several strategies can be employed to create an ecosystem and orchestrate interactions that result in meaningful value creation on digital MSPs. Firstly, the orchestrators of digital MSPs must facilitate the attraction of key actors based on common interests. The digital MSP must be conceptualised in a way that the benefits which accrue from the interactions of the key actors draw them together, thereby avoiding the 'circular conundrum' (Spulber 2010). A circular conundrum simply means that a seller must attract a buyer, and a buyer must attract a seller. This leads to the so-called chicken-and-egg dilemma where consumers on one side will not participate without consumers on the other side of the platform, and vice versa (Ardolino et al 2020). To solve the problem of the circular conundrum and enhance adoption, digital MSP owners must incentivise to attract key actors and reduce the anticipated risks involved in participation to the barest minimum (Spulber 2010). The adoption thresholds increase when more key actors join a platform, and fewer leave the platform. The usefulness of a platform depends on the adoption by participants with common or complementary interests (Veisdal 2020). Although conflicts of interest can occasionally arise due to key actors' varying interests, digital MSP owners must bring their managerial acumen to bear to sustain interactions and keep the ecosystem's momentum going (Panda & Leepsa 2017). Thus, the floaters of digital MSPs must coordinate their self-interest as risk-takers and align it with the interests of other risk-averse actors to enable an ecosystem of creating rich value environments. To maximise the creation and utilisation of value in an ecosystem for the

benefit of all key actors, digital MSP owners must ensure proper coordination, control and better governance mechanisms (ibid). Schreieck et al (2018) insist that platform governance is a significant way to mastermind interaction and facilitate value creation on digital MSPs.

Another way of building an ecosystem is first to make one side of the platform viable. Since digital MSPs are based on the principle that the viability of one side of the platform makes the other side attractive for interactions and value creation, facilitators of digital MSPs can concentrate their efforts on wooing anchor complementors, especially on one side of the platform. Anchor complementors refer to interdependent consumers whose presence attracts other key actors to the platform. They enhance the utility derived from platforms by creating complementary products (Eckhardt, Ciuchta & Carp 2018) that create value for other actors. As part of a strategy to lure anchor complementors and make the digital MSP viable, the value proposition of the digital MSPs must correspond with the interests of anchor complementors. This will force a shift towards a platform which attracts key actors that are collaborative and interdependent by nature, involving business models that create value for participants (Yablonsky 2020).

Similarly, digital MSP owners can incentivise a platform by subsidising one side – in other words, by making one side free and making the other side pay. This strategy is known as a non-neutral price mechanism. It allows digital MSP owners to set prices on one side of an MSP below a marginal cost. When price mechanisms are non-neutral, it portrays a scenario where 'optimal prices can be below the marginal cost of provision on one market side while being above on the other side(s); end-users with lower price elasticities will typically be overcharged and vice versa' (OECD 2018).

However, such a strategy can enable digital MSPs to quickly create a critical mass of ecosystems that can grow monotonically as more actors join the system (Oh & Monge 2016). Critical mass is the point at which the sheer size of a network triggers further exponential growth, as more actors join the network. It is a saturation point in the growth path of a digital MSP – even if some members of the network are quitting or dropping, and this will have little or no effect on the existence of the platform. This critical mass of consumers/users ignites and heightens interactions on the digital MSP. Nevertheless, achieving such a critical mass depends crucially upon the creation of network effects and externalities. Therefore, the digital MSP becomes viable when a critical mass is reached due to network effects - when masses of people are joining, interacting and creating value on the platform.

2.3 Network effects

Network effects can be described as a phenomenon that depends on the number of consumers or users and adopters of a digital platform. Network effects or externalities refer to the value and utility accruing to key actors as more and more join the digital MSP. This phenomenon ultimately creates a feedback loop that significantly influences the digital MSP ecosystem.

Direct network (same-side) effects are the value users derive from buying or using free products, as more consumers purchase and use those products. However, direct network effects on digital MSPs occur as more and more users join the platform from the same side. In other words, it is the value a key actor on one side of a platform enjoys as more key actors join the same side, interact, and create value. For example, a direct network effect may refer to the utility a millennial derives from a network as more millennials join the network. There is a positive direct network effect when the size of the network on the same side of a platform increases, resulting in more utility for users and vice versa.

By contrast, an indirect (cross-side) network effect is enabled when more users on one side and complementary producers on the other side are attracted to a MSP as a result of the interaction taking place on the platform (OECD 2018) -- for example, when millennials on one side of a platform benefit from interactions with advertisers on the other side, and vice versa. Another way of expressing an indirect network effect is to consider it as a situation where the actions or behaviour of key actors on both sides of the platform either have a positive or negative effect on each of the sides (Isckia, De Reuver & Lescop 2020).

However, as people continue to join a digital MSP, and interactions heighten, network externalities (effects) are established and value creation increases, this can lead to market-tipping, or excess inertia. Tipping is the rise of a domineering brand through the process of positive feedback, or what economists refer to as multiple equilibria (Dubé, Hitsch & Chintagunta 2010). Market-tipping occurs when there are few or no benefits accruing to end-users from product differentiation, and a high cost of switching and multihoming (Hagiu & Yoffie 2016).

Multihoming occurs when users subscribe to and use multiple platforms concurrently, which is common for social media users (Belleflamme 2020). Additionally, there is little or no space for competition in a market with strong positive network effects. The incumbents may monopolise and dominate the space and use their position to crowd out small competitors. They can grow and inevitably reach a situation where they can no longer be price-takers. 'Not-a-price-taker' phenomenon is where a few brands can become prominent and influential enough to influence or manipulate market prices in their favour (OECD 2018).

3 Brands and digital MSPs

3.1 Interoperable brands

Brands are organisations of networks of people or products. They are the symbolic representation of value creation and co-creation in the mind of the users of digital MSPs. Therefore, value is a perception. Perceived value includes meaningful value and experiences associated with a particular brand. Brands are also used as symbols of identity and interaction between key actors on digital MSPs.

Consumer relationships are not only based on the functionalities of a brand, but also through symbolic and perceived value. Brands have symbolic value for consumers that is influenced by associated socio-cultural meanings linked to the ownership and use of brands (Ravasi & Rindova 2008). Brands are also interactive symbols in the minds of users. As part of an ecosystem, brands enable the formation of value networks on digital MSPs.

For the purposes of this study, brand is defined as advertisers, complementors, suppliers of products, and firms (corporate brands) who use boundary resources to create and exchange meaningful value on digital MSPs. They produce, supply, and complete digital MSP owners' efforts in the creation and sharing of value. Brands occupy one or more component sides of digital MSP because of their sheer size and distinctive characteristics. The brands on digital MSPs are interoperable (compatible), and are also interdependent (co-dependent) consumers with the users on the other sides (components) of the platform.

Interoperability is the basis for effective and efficient communication of component sides of digital MSPs. Interoperability enables brands to perform their functionalities with precision

and speed, and helps meet the yearning of users for the symbolic creation and co-creation of value that fulfils their dreams, hopes, statuses, and social standings. Interoperability is the ability of two or more systems to transmit meaningful data or essential information seamlessly from component to component and use the exchanged data (Gasser 2016).

In the same vein, (Kerber & Schweitzer 2017) describe interoperability as the attributes embedded in a system or product that enable it to communicate optimally with other technically different systems or products. In 4IR, the composite of value creation in a system requires the components to work together and to be seamlessly compatible with each other. Compatibility refers to the 'ability of two or more systems or components to perform their required functions while sharing the same hardware or software environment' (IEEE 1990).

In distributed systems, including digital MSPs, modularity, namely where elements or components of a digital system interact and talk, plays a key role in their interoperability. Modularity permits digital MSPs to efficiently connect disparate technologies, and quickly adapt to 'changing conditions' (Kiesling 2021). These interconnections of digital modules allow for seamless interactions and exchange across components of digital MSPs. Hence interoperability can be described as a shift in connectivity, enabling the interconnections and interdependencies of components of digital systems.

However, within the ambit of value creation, interoperability can be regarded as the ability of two or more components of a system comprising interconnected and interdependent consumers to create, share, and consume value at an accelerated speed and pace. Interoperability accelerates consumer centricity, which aims to put the consumer first, find a solution to the consumer's problem, and create value for the consumer. It enables consumers to obtain a seamless user experience at every touchpoint. Interoperability is thus enabled if the interdependent consumers or key actors operating on the various sides of digital MSPs can seamlessly create, co-create, collaborate and consume value. When interoperability is enabled on digital MSPs, key actors use boundary resources such as Application Programming Interfaces (APIs), application (app) stores, and software development kits (SDKs) to create and co-create value.

However, allowing the interplay of demand and supply on digital MSPs to determine interoperability can be subject to 'severe market failures when the degree of interoperability is determined unilaterally by a dominant firm, or when the market gravitates towards a uniform technical standard with natural monopoly characteristics' (Kerber & Schweitzer 2017). This can give rise to a 'monopoly-like pricing structure' that primarily benefits the dominant platform owners (Mattila & Seppälä 2018).

3.2 Complementarity of a brand on digital MSPs

Complementarity is a phenomenon in social relations whereby actors involved in social interactions are attracted to other actors who possess the character, skills, and qualities they lack, and will fill the void existing in their own lives, thereby making them 'complete'. According to Wang and Busemeyer (2015), 'phenomena are complementary when (a) they are mutually exclusive, and only one can be applied at any time; and (b) they are all necessary for a comprehensive account of these phenomena'. This implies that complementarity exists when phenomena are incompatible.

Each of these phenomena exists independently, yet they need each other to achieve a comprehensive outcome. In other words, two brands can be produced independently of each

other, yet buying or using one alone is less valuable, and they become more meaningful or useful when purchased or used together.

Similarly, the demand for such complementary brands is affected by their price and the price of their complementors. Thus such brands provide greater value and enduring user experience when consumed together than separately. Therefore 'complementary products or services are utilised in combination with one another' (Avgeropoulos et al 2015:1).

In digital MSP parlance, complementarity exists in such a way that the value creation activities of third party producers like software and application developers, suppliers, and advertisers help to complete the value creation efforts of platform owners. Specifically, many third party producers specialise in providing value and services that will act as complementary products and services to those already offered by digital platform owners. Attracting them to digital MSPs will create an ecosystem of complementors on one side and interdependent consumers on the other side(s). Complementors are a group of suppliers that offer complementary products or services for the purpose of interactions or transactions on the component sides of digital MSPs. Their extensive presence or ecosystem leads to network effects as interactions heighten between the interdependent consumers. Thus, it is in the interest of digital MSP owners to attract these key actors in order to enable the formation of an ecosystem and to coordinate, manage, and govern them to ensure that the value associated with economies of scale and network effects will benefit all actors.

4 Millennial prosumers

4.1 The concept of prosumption behaviours

The advent of 4IR technologies enables the meaningful participation of consumers in all dimensions of production processes, including design, manufacturing and distribution (Cohen 2013). These digital technologies have successfully removed the barriers separating production from consumption, and blurred the consumer and producer boundary. They enable hitherto passive consumers to become active participants in the production, consumption and storage of value. They participate on multiple sides of digital MSPs as both consumers and producers, and thus play the role of prosumers.

The massive presence of these key actors has changed the social and economic dynamic on digital platforms (Alderete 2017). Consumers are not passive consumers of products and services, but are increasingly getting involved in creating and co-creating value from concept to outcome. They possess surprising knowledge and skills that play an active role in the process of value creation (Tian, Shen & Chen 2017). Brands should no longer regard consumers as passive recipients but as creative individuals, because the production process is part of the users' consumption experience (Shen, Qin & Luo 2020).

The term prosumption was coined by Alvin Toffler in 1980 and is related to a combination of production and consumption (Ritzer, Dean & Jurgenson 2012). Prosumption represents a situation where consumers can produce products for their use (Tian, Shen & Chen 2017). Therefore, it becomes a fusion of production and consumption, which makes the consumer the maker. Prosumption involves some form of participation by key actors (consumers) in the act of value creation. Of particular importance is the idea of creating 'use-value' and re-orientating 'exchange value' (Bond et al 2020).

According to Shen, Qin and Luo (2020), the difference between the consumer and producer lies only in the difference between 'value in use' and 'value in exchange'. For instance, the brand can make a product with a view to exchanging it for money, while a consumer may consume it partly within his or her household and exchange the remainder with others for money. In the context of communication, information flow is both unidirectional and bidirectional -- in prosumption behaviours, the sender/source can be the receiver, and the receiver can also be the sender/source. It is where an individual can seamlessly move from being a consumer of information to a contributor or creator (Bond et al 2020).

Hence prosumption is so inseparably and interchangeably linked to the consumer and producer that it seems difficult to distinguish between them visually. Therefore, for the purposes of this study, prosumption is defined as sole creation, co-creation, collaboration, and the consumption of value made possible by the interoperability of the components on digital MSPs. Thus, value is a series of dynamic social and economic activities created, communicated, exchanged, consumed and prosumed on digital platforms.

3.1 The prosumption behaviours of millennials

The prosumption behaviours and practices of millennials on digital MSPs have been rising appreciably over the years. The growth in prosumption practices, or user-generated content, signals that the 'consumers have arguably taken over the creation and distribution of content' (Rayna & Striukova 2016: 218). However, millennial interactions on digital MSPs mainly revolve around prosumption practices of content creation, exchange and the online sharing economy. Content can be defined as 'units or bundles of symbolic communication, fixed in some material form, and shared in the context of some medium' (Burgess & Woodford 2015). Content creation includes blogging, online reputation management, editing, online community management, commentary, updating websites, podcasts and videos, and distribution. Content represents symbolic interaction that helps in facilitating the digital transformation of communication networks. Burgess and Woodford (2015) ascribe the transformation of communication systems, practices, and the emergence of global media brands to the rise in diverse kinds of content creation. On the other hand, (Cohen 2013) contends that consumers/users do not just create value for digital MSP owners through content creation, but also 'generate a new commodity form: the cybernetic commodity'. Cybernetic commodity includes the information or feedback generated from the actions and interactions online (Cohen 2013) that create meaningful value.

5 The framework

For value creation to exist and thrive on digital MSPs, the formation of interests and social relations must be formidable. Key actors must see some pecuniary/nonpecuniary benefits that will likely benefit them or benefit others they represent as agents. Interests on digital MSPs can be congruent, common, divergent or conflicting. Given that these co-variations of multiple interests represent value created and appropriated in variable proportions on the digital MSPs, it affects the interactions and relations between the key actors or interdependent consumers.

Thus the vital element for value creation on digital MSPs is the coming together of complementary interests, or the realignment of interests. Digital platforms that turn the drivers of value creation and realign divergent and possibly unrelated interests thrive and overtake rivals (Pesce, Neirotti & Paolucci 2019).

This framework elucidates the propositions made above. It demonstrates how millennials can interact with themselves and co-create value, and how brands can collaborate with millennials on digital MSPs and create value. It also specifies how millennials can sole-create value independently. In this framework, the millennials and the brands are prominent actors who actively and proactively interact with each other, based on shared interests. Both millennials and the brands are interdependent consumers who reside on the different components of the digital MSPs. The millennials can form dependent and independent relationships with their fellow millennials, and develop interdependent relations with brands. Interactions on digital MSPs involve communication (unidirectional or bidirectional), exchange (distribution, price, demand, supply, payment), consumption Staykova and Damsgaard (2018) and prosumption.

Nonetheless, when millennials interact with other millennials or brands, they frequently exchange big data such as animations, text, video, graphics and audio represented as the ones and zero number system (Liu et al 2021). The use and exchange of these symbols as modes of interaction help to create, communicate and share value. The interactions of millennials and brands leading to the process of value creation exert both unidirectional and bidirectional influences on one another. There are one-to-one, one-to-many, many-to-one, and many to many relations among millennials, and interrelations with brands.

For example, in a bidirectional, many-to-many relationship, millennials are in an interdependent relationship with brands. Millennials and brands can be the source of any interaction. Interaction can originate from the millennials and flow directly to the other millennials, or flow indirectly to the brands, and vice versa. Therefore, they can be the source of information (sender/proposer) and receiver (responder/reciprocator) synchronously or asynchronously.

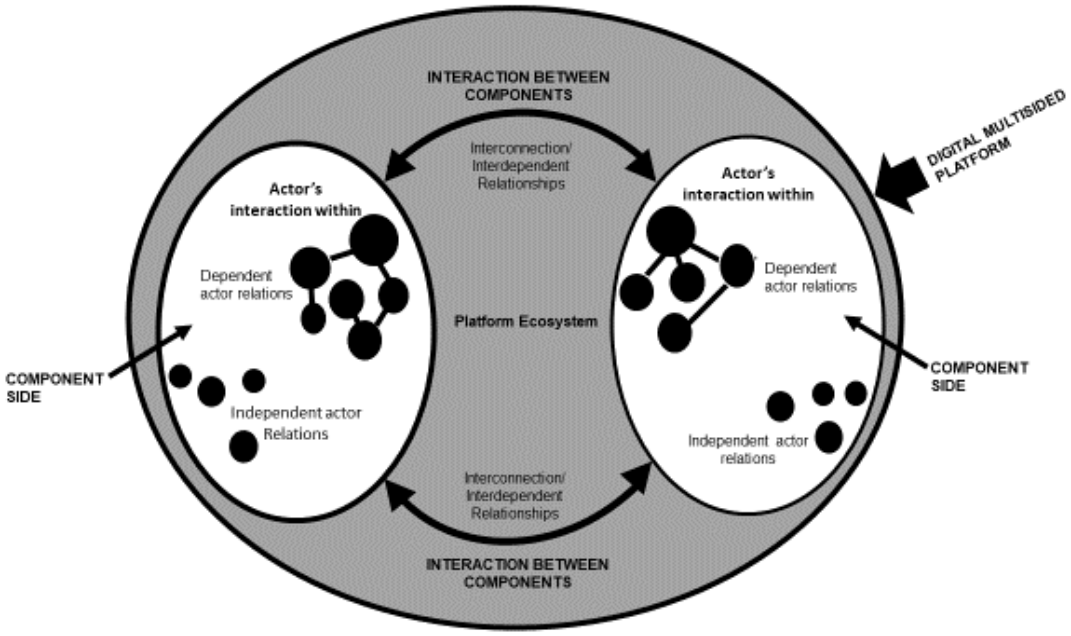

Figure 1: A Framework of millennial Interaction on Digital MSPs.

In the context of value creation, heterogeneous groups like millennials can create value on a one-to-one, one-to-many, many-to-one and many-to-many basis when associations are in one direction. On the other hand, when associations are in two directions, they can also create value on a one-to-one, one-to-many, many-to-one, and a concurrent many-to-many basis.

When the millennials form dependent relations, they either cooperate or rely on each other to create value. In this regard, the millennials are altogether engaged in a shared interest. Their joint efforts, cooperation and partnerships result in value co-creation.

When millennials are in independent relations, they are engaging in value creation by employing their talents, skills and ingenuity only in the value creation process. They are not relying on one another for this sole or self-help value creation effort. The sole-creation approach to value creation is an approach where the individual or agent seeking the means to create value undertakes the task alone without involving others. Thus, when millennials want to create content, they can either alone (sole or self-creation) or with other millennials (co-creation).

6 Findings

The framework posited in this study suggests a cyclical or non-linear value-interdependent relation between millennials and brands. A non-linear relation is a condition whereby a slight change on one side of the system can significantly impact the whole network, and vice versa. A high positive size effect of interdependent relations between millennials and brands instigates an enormous proportion of value creation. Consequently, there is an invariable feedback loop in the system, which benefits all key actors in this dynamic ecosystem. The activities, data, insights, and value resulting from the circular flow are plugged into the value creation process to create additional value for key actors.

The basic system architecture of digital MSPs automatically places value creation under the firm control of their owners. Also, since the power to control, coordinate and govern digital MSPs rests with the platform owners, it gives them an excessive edge over the appropriation and sharing of value by brand owners, unlike Arvidsson's prediction in his seminal piece 'The Logic of the Brand' (2014). Moreover, value flows from a centrally held source to interdependent consumers. Nevertheless, for satisfactory social relations to exist, the basis of value distribution must meet the basic requirements of demand for value. Therefore, the intermediating role of digital MSP owners is vitally important. They matchmake the commonalities of interests existing among interdependent consumers, and ensure that the demand for value matches the supply of value.

Holding the digital MSP owners constant, it is the commonalities of interest shared by the millennials and brands that bring them together. Both the millennials and the brands need each other and endeavour to create value independently with and interdependently across all sides of platform ecosystems. Dependence and independence capture the creation and co-creational activities within the components (sides) of digital MSPs.

However, interdependence encapsulates the logic behind the collaboration between the millennials and brands in the value creation process across the sides of digital MSPs. When the value is created or generated dependently/independently, value creation activities are co-created or sole-created and concentrated on one side. In contrast, when value is interdependently created, there is synergy, partnership and collaboration between the sides of the digital MSPs.

7 Conclusion

Interoperability determines the degree of interdependent relations. How interoperable the brand and the components of digital MSPs are, is a function of business interoperability and scalability. Value exchange is based on the choice, wants and needs of either the millennials or the brands. Value flows from both sides, and any side can be the source or receiver at any interactive moment. While the needs and wants of both millennials and brands are diverse, choices depend on the preferences of these key actors. Although the decision to create, exchange, or consume value resides with these key actors (millennials and the brands) in this dynamic social relation framework, there can be multiple ways of creating brands by complementors, suppliers (prosumers). These multiple equilibria, in most situations, make it difficult for users to differentiate brands in choice-making.

Finally, this framework has shown that bringing together complementary interests to form an ecosystem depends mainly on the degree of interoperability or compatibility enabled by digital MSPs. If the components of digital MSP are incompatible and inflexible, it indicates how difficult it will be to bring complementary interests together, or to realign divergent interests and inform an interdependent relation. The study also shows that a consumer is no longer a passive role player but a proactive and vibrant one who can, through self-help, create value, collaborate with others to create value, and who can consume the value created.

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