

INDUSTRY 4.0: DIGITAL ECOSYSTEMS AND SMART SERVICES IN BUSINESS

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ABSTRACT

There is no doubt that the emergence of new technology and innovation is having a tremendous influence in our regular day-to-day lives, culture and business. With "Industry 4.0", the name given to the developing blend of traditional manufacturing and industrialized platforms and practices together with the most recent smart technology, digital transformation is at the forefront of numerous organizations' strategy implementation in recent years. This has given birth to "Digital ecosystems". As some companies today are gradually incorporating the digital ecosystem model in different sections of their businesses to improve smart products and services delivery, industry performance and communication with the various stakeholders, others are still slacking as reported in Gartner's 2017 CIO Agenda report.

Therefore, this paper seeks to examine the idea of Digital Ecosystem and how it can profit the business with emphasis on the benefits and challenges of operating in a digital ecosystem geared towards improving smart services' delivery in the era of Industry 4.0. The Digital Ecosystems idea is generally a new notion in the field of business research, and much work stays to be done to build it. The research technique utilized was the descriptive audit that recognizes what was expounded on by other authors regarding the theme. The multifaceted nature of Business Ecosystems shows up in four different aspects, which are technology, people, strategy and channels. To conclude, the paper gives a short prologue to Digital Ecosystems and focuses on the reasons and benefits for Digital Enterprise Ecosystems.

KEY WORDS: Industry 4.0, Digital ecosystems, Smart services, transformation, platforms, partners.

INTRODUCTION

The digital scene has changed extremely in the previous decade, and new advances in innovation are making way for digital change. This digital change is shifting business models especially the way companies share data across their different stakeholders. Basically, the digital revolution has become the new drive for business development for instance new advances in technology imply that organizations need to keep pace quickly in the event that they need to get by in the realm of the great digital transformation.

Digital transformation is not simply altering how products are made, it is also changing how they are consumed and managed in their life cycle, from ideation to end of life: In summary, the whole value chain. In spite of being essential to building internal efficiencies, Industry 4.0 that involves smart associated products based on digitized processing plants and stages is too narrow to even think about unlocking the full extent of opportunities generated by this exceptional change. As many companies are garnering towards digital transformation, the ability to create a digital ecosystem is critical to digital transformation success. Digital businesses have managed to drive value for clients through shifting their emphasis on the external client's perspective other than internal contributions and practices alone however this success depends on their network coverage and digital partnerships.

INDUSTRY 4.0

One of the pioneers of Industry 4.0, the Platform Industry 4.0; describes the term as "the smart systems administration of machines and procedures in industry with the guide of data and correspondence technology". Industry 4.0, in this manner, implies the combination of digitalization with conventional modern procedures. This results in smart value chains and product lifecycles that start with advancement, skilled manufacturing, assembly, product transportation and maintenance, and end with reprocessing (Waschbusch and Stark, 2019).

Before Industry 4.0, there were other pioneer industrial revolutions 1,2, &3; the first industrial revolution lasted between 1760 to 1840 and was triggered by the construction of railroads plus the creation of the steam engine thus ushering in the era of mechanical production, this was further enhanced with the introduction of electricity and assembly lines in the automotive industry by Henry Ford in 1913 which made production more efficient as there was

specialization in workplaces during the second industrial revolution. The third mechanical transformation started during the 1960s and was considerably affected by the improvement of semiconductors, centralized server computers (1960s), personal computers (1970s and 1980s) and the Internet (1990s). The Fourth Industrial Revolution, otherwise called Industry 4.0, is the time of digitalization that is significantly shaped by the current physical and digital trends such as 3D printing, Robotics, Artificial Intelligence among others. This revolution has bred the largest digital megatrend that bridges the physical and virtual worlds otherwise known as the Internet of Things (IoT) thus increasing the networking of people, objects and machines with the internet leading to emergence of new business models (Waschbusch and Stark, 2019).

As organizations increasingly incorporate their core business functionalities with emerging digital trends, platforms and third parties, innovative pioneer companies are leveraging these changes to create new advanced ecosystems. As they do, they are structuring future value chains that will transform how organizations market their products, services and even communicate with their customers. As these ecosystems last, businesses are redefining their brand delivery in their various industries leveraging on development of smart factories and smart services or products delivery.

SMART SERVICES

A Smart Service is a computerized service that responds on gathered and investigated information dependent on systematized, insightful technical frameworks and platforms. In contrast to the innovation of Industry 4.0, which can exist in only one explicit division of a firm, Smart Services require cross-functional zones. These regions give services that answer to analyzed information of different territories. Territories can be various departments in a single organization or different organizations that operate as players in a system. The figure below portrays the relationship of the alliance between the several players, the technical advancement and the subsequent result of Smart Services. As opposed to usual products, "Smart Products" are items or components with embedded frameworks, which can gather, convey and link information (Jasperneite and Pöppelbuß, 2014).

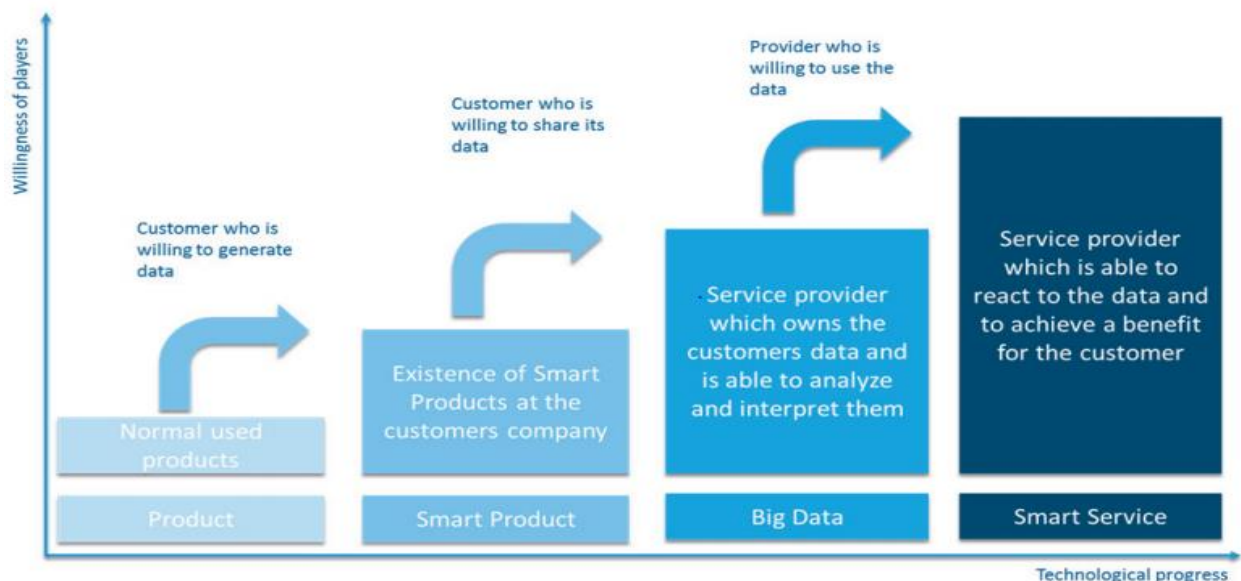


Figure 1: Requirements for a Smart Service

In managing Smart Services, there should be distinctly described premises. One of them is the “usage direction”. The additional value should be focused and adjusted to explicit circumstances and settings. Secondly, the accessibility of Smart Data. In order to create the information, Smart Products are utilized; in this way, information can be gathered consistently. The information is consolidated in real time from different sources. This makes it possible to make predictions for future circumstances. Smart Services are promoted and accessed through digital platforms. They are accessible to the client wherever and whenever. The electronic access offers quick discharge cycles and is well adaptable for suppliers. (Pöppelbuß, 2014)

What is required is a progressively thorough perspective on value creation: one that uses the intensity of smart services as the foundation of the end-to-end digital value chain portrayed by Industry 4.0 and it can be realized through the development of reliable ecosystems to aid digital transformation.

DIGITAL ECOSYSTEMS

Digital ecosystems can be understood as a net underneath the developing technologies included in the Digital Platform series that is micro-services, transportation models and server-less registrations, which are general constituents that fit within explicit, decentralized business ecosystems.

A Digital ecosystem is a collection of interconnected data technology assets that can work as a unit (Rouse, 2019). Digital ecosystems are comprised of suppliers, clients, trading associates, applications, data service specialists and every corresponding technology. It is related to a group of enterprises, individuals and things that offer standardized digital stages for a mutual valuable purpose for example; business increase, advancement or common interest thus, digital ecosystems empower businesses to associate with their clients, partners, adjacent companies and competitors. In setting up this form of ecosystem, any firm's bottom line can be boosted no matter which industry it is situated. This is because it allows an organization to control new and old technologies, build computerized processes and structure and consequently grow the business

ChaiOne defines a digital ecosystem as a sequence of digital products bound together through a platform, which resolves a number of problems for a varied client base with a mutual goal of bringing competitiveness to the business (Eggleston, 2017). Which means that digital ecosystems comprise of organizations, individuals, information, procedures and things that are linked by the mutual usage of digital platforms (Hardin, 2018). The idea is to create a range of flexible services that can move around swiftly and be adaptable to the evolving needs of a business. These connections empower mutually beneficial results for parties involved.



Figure 2: Representation of a digital ecosystem

Ecosystems are the new markets: they link a collection of services and vendors on one stage to offer an all-inclusive experience to the users. With buyers having the power of decision in the palm of their hands, the ordinary business to consumer (B2C) relationship has been changed. Retailers can never again be physical foundations that depend on geographical convenience to nurture customer dedication. Buyers have variety to choices and thanks to the popularity of smartphones; they can access their favorite products or services from the comfort of their own home, working environment or on the go. Each organization in the digital transformation has had to adjust to this new arrangement to keep up and extend their client base (Avramakis et al., 2019).

A significant number of the leading organizations today are ecosystem players for instance: Alibaba, Alphabet Inc., Amazon, Apple, Facebook, Microsoft, among others. These ecosystems have developed quickly and rule their corresponding industries for a number of reasons. Online retail traders can offer their products or services at exceptionally lower prices because of low overheads, and the collection of massive buyer information that has empowered targeted marketing and sales activities that were impossible prior to the digitization of the marketplace. This information is helping organizations move from modest simple digital marketplaces to progressively complex ecosystems that cross regional borders.

Factors for success of digital ecosystems

Access to new sources of information is fundamental to the triumph of ecosystems. The development of future system structures, clients' ability and readiness to switch and their receptiveness of the administrative system

are also substantial elements to be considered particularly by organizations hoping to join an ecosystem or set up one of their own.

Digital ecosystems are often prepared and measured by industry pioneers; the model has its foundations in keiretsu and is rapidly affecting change in different businesses, including consumer goods, automotive and medical services. The combination of business-to-business (B2B) practices, enterprise applications and information in an ecosystem enables a company to control new and old technological tools, assemble mechanized procedures around them and reliably develop their business (Rouse, 2019). However, unmanaged and natural development of an ecosystem can be lethal to a business therefore, it is significant when assembling an ecosystem to guarantee that all conditions have been distinguished and can be controlled. Making a digital ecosystem map is a vital aspect for building up a solid ecosystem. The digital ecosystem map is a visual outline of every digital device and stages utilized inside the organization. It outlines procedures, how information is moved between parts of the ecosystem and whether the procedure is mechanized or manual. To be operative, mapping ought to record which frameworks are not presently associated or ready to communicate and move information between one another, as well as who the clients of every framework are and who is liable for looking after them.

The five success factors for productivity of digital ecosystems include; an appropriate strategy and value proposition for attaining the best platform partners, a robust user base, scalability and flexibility to form partnerships from various industries, a wider geographic scope and last but not the least, a healthy partnership proficiency between platform associates (Jacobides et al., 2019).

From Alexa and Siri to Philips Digital Healthcare to BMW's and Volkswagen's connected-car ecosystems, the race is on to meet new client needs using digitally empowered synchronized efforts. Despite the fact that eagerness about digital ecosystems is rising, many company administrators still do not completely understand what makes a specific digital ecosystem productive. To reveal insight into this subject, Boston Consulting Group assembled information and talked with industry specialists to find what isolates digital ecosystems that work from those that do not. BCG asserts that estimating ecosystem achievements is shockingly challenging as members of the platform do not have separate records or perfectly outlined examinations of performance. In their study, BCG concentrated on three metrics to be considered in measuring the productivity of ecosystems; these include financials, innovation, and total number of users and growth (Jacobides et al., 2019).

Challenges faced in the incorporation of digital ecosystems in business

Innovative organizations moving from operating independently to digital ecosystems need to have a strategic vision as a top priority when entering these digital associations. Looking at the bigger picture, organizations are faced with the challenge of figuring out who will influence the next generation of business services when working out their unique ecosystems however, the main challenge relates to interoperability; a perspective that originates from information and computer science therefore, it checks technological, logic and structural aspects of the organization.

Technological difficulties and hindrances for digital business ecosystems lie in the level of incompatibility of data technologies for instance designs, stages or framework. These obstacles largely concern the criterions to present, store, exchange, process and communicate data from entities within the ecosystem. Secondly, the digital interfaces and rules for information exchange are yet to mature for many companies (Chen et al., 2008). This particularly relates to SMEs who in general struggle with these important requirements. Additionally, there are organizational challenges too. The organizations that partake in the ecosystem trend have unique structures and normally pursue different logics in terms of management, obligations and self-reliance. There are distinctive semantics, cultures and styles of communication. Ongoing research studies argue that coherency between decision-making standards can be an essential requirement for the evolution of ecosystems (Wilkens et al., 2016). This coherency appears to be significant for an unbiased relationship and a level of trust between independent partners.

It is shockingly difficult tending to the ecosystem challenges arising from these different points. However, in our observation, success will rely upon a profound knowledge of the business landscape, proper planning and execution. Furthermore, understanding how the firms should offer incentive in their preferred ecosystem.

Benefits of digital ecosystems in a company

Asia is right now amidst a digital and technological innovation boom. The rise of digital giants including China's Tencent, Alibaba, and Baidu; Japan's Rakuten and SoftBank; South East Asia's Grab and Go-Jek; and India's Paytm is clear proof of the pattern. These organizations and others are flourishing in light of the fact that they can access capital coupled with the fact that Asian customers are particularly open to new & versatile mobile and web innovations. The digital affluence is a notable challenge for companies that still employ traditional business models. Threatened with

the pressure to digitize and experiencing latent performance, numerous companies are looking for opportunities to change and jump onto the digitalization train. This has driven them to embrace ecosystems, working together with various organizations that offer digitally accessible, multi-industry solutions dependent on emerging technologies. This goes on to say, that ecosystems present several vital advantages in an environment where traditional companies are losing growth momentum.

Each new digital ecosystem is one of a kind, similar to meticulously chosen parts that serve a purpose both individually and together. They enable organizations to move quicker, expand efficiently, and limit on-premises ventures and liabilities. The innate advantages increase with each partner company sharing applications, data and bandwidth through common utilization of the ecosystem (Zangre, 2018).

New digital ecosystems enable organizations to be progressively flexible and versatile; with the weight of infrastructural management and other IT obligations removed from their plates, entering a long-lasting digital association saves time for organizations to assemble better systems as well as moving from short-term profitability to long-term development and value creation (Hardin, 2018).

Setting up a digital ecosystem can assist with building relations between individuals, departments and industries. Hardin said, "You're not merely constructing a digital business," he says, "but a progressively associated, increasingly proficient digital society – from smart cities to agricultural frameworks that can nourish billions, to the requirement for less health center beds."

Digital ecosystems can influence operations, transport and marketability of products or services and the industry as a whole. This in turn may affect the revenue generation and profitability of the companies involved and enable smart service provision/delivery as a result. In 2015, organizations that generated at least half of their income through utilization of digital ecosystems saw development and profits that were between 27–32% higher than the usual (Hardin, 2018).

In addition, digital ecosystems enable enterprises to efficiently manage their business processes thus driving business value to the customers, partners and the company as a whole. The ways in which digital ecosystems drive value include; creation of new revenue streams through consolidated ecosystem integration, improvement of customer service/ partner relationships, reduction in operational costs, and promptness in technology adoption (Hughes, 2019).

Furthermore, the digital ecosystem trend is not only influencing the way companies conduct their business relations. Today emergency clinics, farms and homes are advancing into digital ecosystems of their own, with solid innovative technology that is improving our lives in real time. Therefore, the "digital ecosystem" expression is beginning to mean as much as "digital transformation". In the event that organizations get this procedure right, the prospects are unending. As Gartner Research senior VP Peter Sondergaard says, the definitive advantage of a digital ecosystem stretches beyond the achievement of any distinct individual or organization (Bennett, 2017).

Digital ecosystems; market examples

Ecosystems can be particularly important; for the most part, they increase consumer expenditure when they link online and offline domains. For example, interacting with a doctor online and he analyses your diagnosis from readings on your cell phone or any digitally-enabled gadget, and afterwards you go to a drug store to pick your prescription, this is a case of how both online and offline services connect to make service delivery and people's lives easier. Moreover, in the UK people can FaceTime doctors or call National Health Services' (NHS) online practitioners when they are unable to leave their houses for general medical attention (Avramakis, 2019). Nowadays people who get away for fun or business excursions and do not wish to lodge in a hotel, hire another person's home or any other form of accommodation conveniently through websites like:- Airbnb.

The modern banking application is one case of a digital ecosystem. The ecosystems made through these claims incorporate all services and applications into one place; including cost administrators, digital wallets, web based banking and digital chequebooks. An intimate example of this would be "Danske Bank", a Danish firm that created an online framework connecting client information with housing market listings. This gave potential homebuyers taxation, electric and heating cost estimations in addition to an inventory of real estate experts, data and service providers; and solid, dependable money-related advice (Rouse, 2019).

Moreover, the healthcare industry is also finding digital ecosystems advantageous. A digital healthcare ecosystem consolidates every touchpoint in a patient's journey; including booking appointments, setting appointment reminders, storage of test results and recording patient prescriptions. The ecosystems help medical organizations to keep up consistence with industry and government prerequisites by ensuring they have the essential documentation.

Besides, numerous healthcare organizations are investigating how to incorporate Artificial Intelligence (AI) and Machine Learning (ML) into their frameworks as a method to improve consumer experiences and basic

leadership practices. A digital ecosystem will make this possible by guaranteeing that the right information is accessible at the right time, enabling medical organizations to exploit the advantages AI and ML offer (Rouse, 2019). The automobile businesses are likewise receiving digital ecosystems with open arms. For instance, previously, car producers either shaped coalitions with a unique hardware manufacturers or forged legally binding relationships with several providers to acquire the essential parts for constructing a specific car. Presently, any typical automobile company will utilize an ecosystem of about 30 partners, five different industries and several nations to manufacture vehicles that are self-governing, electric and associated with the organization's digital stage.

Another example of a successful business digital ecosystem is Amazon's Alexa. Amazon is among the big four tech companies and the largest e-retailer with over 49% market share in the United States alone. It focuses on e-commerce, cloud computing, digital streaming and artificial intelligence. The development of Alexa (virtual assistant) by Amazon was inspired by the company's need to ease the lives of their customers in accessing company products and also provide Alexa related services to other organizations plus individuals at large. Alexa can help a user in making to-do lists, live streaming, listening to audiobooks, messaging among others where as in organizations it can be used to join business conference calls, scheduling of meetings and meeting rooms just to mention but a few. Since its inception, Alexa has connected over 38 core partners forging partnerships in 4 continents and 11 countries with diverse cultures. This has boosted Amazon's flexibility thus fostering collaboration and value creation across the ecosystem (Jacobides, 2019).

The evolution of Amazon's digital ecosystem; a case study

Rather than focusing on direct suppliers, clients, and broker relations, companies that embrace an ecosystem mindset focus on adding value in better approaches to a lot more partners. They peek at how each party in the ecosystem can bring value to other parties. At the core of each digital ecosystem is a stage plan of action, the one that Amazon has been working on since 2000 describes what this is about:

- Amazon built a solid technology infrastructure to aid its online retail business. It then leased its computing centers to different companies. That business is called Amazon Web Services (AWS). AWS is one of the centers through which Amazon coordinates its own digital ecosystem. Organizations like Netflix, Capital One, and 3M use AWS to help their digital tasks. Third-party programming designers assemble contributions through it, making room for companies to lease its capabilities (Diana, 2019).
- Nevertheless, Amazon not only lets different companies use AWS to offer their digital services. Amazon itself utilizes AWS as a Launchpad for new digital projects like Amazon Studios, a streaming video service. Furthermore, Amazon has coordinated acquisitions like basic food chains such as Whole Foods to set up another consumer channel for its prime members for home conveyance and different services such as personalized subscription clothes service called "Prime Wardrobe". This is all to state that Amazon's industry is not simply retailing. The digital ecosystem in which it works incorporates retailing but goes past beyond; that is to say, it extends to sectors such as IT, media (TV), live music, clothing, food and that is only the tip of the iceberg.

When Amazon entered the BrandZ top five ecosystem brands for the first time in 2017. Its brand value grew by 41% to \$139 billion. This success was largely driven by its expansion in ecosystem. It is reported that each aspect of the ecosystem is connected by Amazon Prime subscription model with all its exclusive benefits (Rogers, 2017).

Future considerations

Digital ecosystems are not just about building a digital business, but rather an associated and proficient digital society. Organizations have grasped this idea for a long while, however 2020 should see more industry pioneers center around forming purposeful loyalties with platform suppliers. The manner in which organizations build their digital partnerships is should be significant as more businesses embrace digital platform models. Organizations will continuously put resources into these digital stages to help give better services and results to both organizations and clients.

The prominence of these new digital networks assists organizations with concentrating on key activities that can help drive success. When an organization chooses to use a third-party platform to help business expansions, in this way making an alternative digital ecosystem, they are selecting the partners they will depend on for a considerable amount of time to come.

In 2019, more new digital ecosystems that incorporate new advancements like IoT, for example, connecting homes, agriculture and healthcare services, are still moderately young. That being stated, organizations are and ought to figure out who their partners will be and where they will fit into their general field-tested strategies so as to build a formidable digital ecosystem. Once executives adopt an ecosystem mindset to evaluate their existing business models and envision future platform opportunities, the biggest challenge is execution; just as in other paths to digital transformation. It takes an ambidextrous approach to optimize the present business model while investing in new models that harness data, new skills and relationships with customers.

CONCLUSION

For traditional firms looking to elevate their digital imprint, ecosystems express a great opportunity to boost development, performance, and outshining competitors. Digital Ecosystems are the future for successful companies; According to McKinsey&Company, ecosystems currently power 7 of the world's 12 leading companies by market capitalization: that is, FACEBOOK, GOOGLE and AMAZON among others. It notes that the ecosystem trend is likely to account for more than 30% of worldwide corporate revenue or 60 trillion dollars in income by 2025. Therefore, for mutual benefits perhaps this is the right time for companies to adopt this platform strategy.

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