2022

Conceptualising Digital Entrepreneurship: Artifacts, Platforms and Infrastructures

Anthony Paul Buckley

Kisito Futonge Nzembayie

Conceptualising Digital Entrepreneurship: Artifacts, Platforms and Infrastructures

Anthony Paul Buckley, TU Dublin, Ireland
Kisito Futonge Nzembayie, Trinity College, Dublin, Ireland

Anthony.buckley@tudublin.ie

Abstract: In this paper we explore how, in the digital age, the micro-level activities of digital entrepreneurs in new venture creation continue to digitally transform and disrupt economic systems at the macro-level. As digital entrepreneurship and other typologies of entrepreneurship in the digital age become increasingly fuzzy, this paper sets out to define the digital entrepreneurship domain – what it is, what is it not and why it is disruptive and distinct. By unbundling the roles of the differing digital technologies at play, we bring much needed clarity to a domain currently noted for its conceptual fuzziness. Our framework, developed from our research, gives academics and practitioners alike a clearer and more accessible way to understanding the digital entrepreneurship domain.

Keywords: Digital Entrepreneurship, Digital Artifacts, Digital Platforms, Digital Infrastructures, External Enablers, Pure Digital Entrepreneurship, Hybrid Digital Entrepreneurship

This paper is based on our blogpost at: Blog - Digital Entrepreneurship (venturingdigital.com)

Introduction

Pervasive digitization has raised significant implications for entrepreneurship in the digital age. Virtually all sectors of the economy have been affected by digital technologies to varying degrees. Not surprisingly, therefore, digital technology-based firms are today the main drivers of economic value creation. Among the top five companies by market capitalization in 2021, four were digital technology-based companies – Apple, Microsoft, Amazon, and Alphabet (Google). These companies have one thing in common – they are digital platform-based organizations.

However, if we journey back 15 years, the opposite is true. Traditional organizations such as ExxonMobil, General Electric, and Citigroup were among the top 5 companies, with Microsoft being the only digital technology-based company. What this shows is a seismic shift in the basis of economic value creation in about a decade. We are indeed in a Second Machine Age or Fourth Industrial Revolution (Schwab, 2017), marked by the 'digitization of just about everything' as pointed out by Brynjolfsson & McAfee (2014). In this new age, 'software is eating the world,' as Andreessen (2011) figuratively puts it.

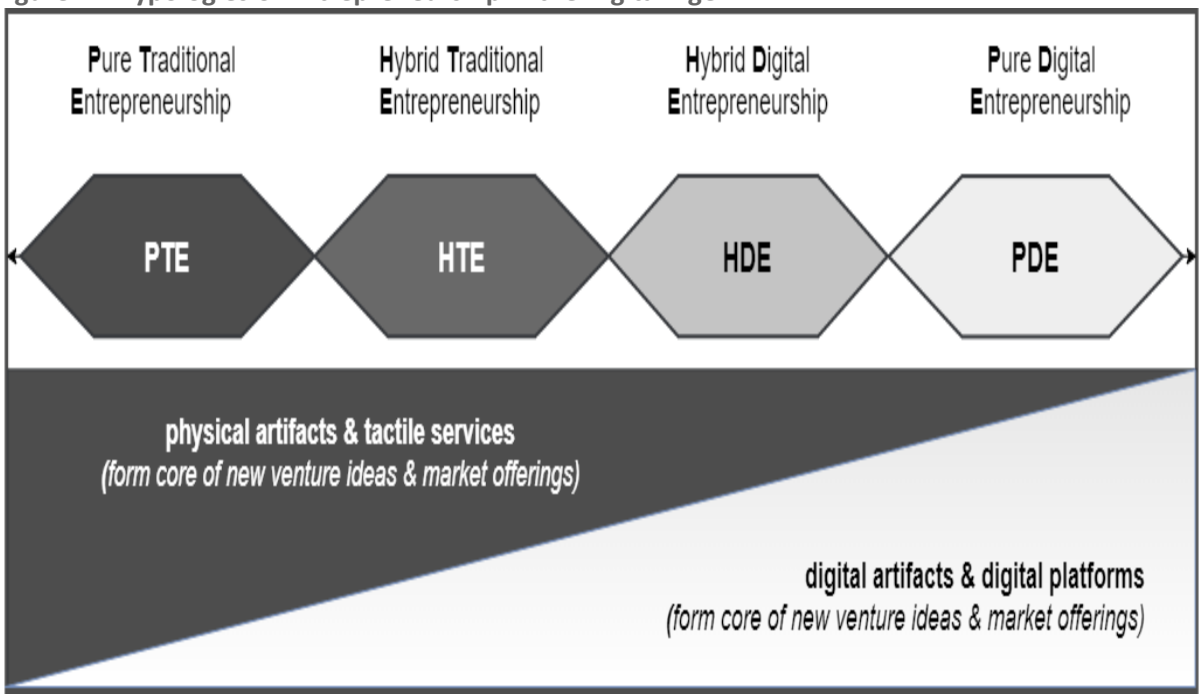
But does pervasive digitization imply that all new venture creation in the digital age is somehow digital entrepreneurship? Our answer to that is an emphatic No! However, we are sympathetic to the fact that the blurring of lines between digital and traditional forms of entrepreneurship presents both conceptual and practical difficulties for those looking to engage with the subject as noted by Nambisan (2017), Kraus et al. (2018) and Ulhoi (2021).

So, what is digital entrepreneurship? Digital entrepreneurship specifically refers to entrepreneurship in which digital artifacts and digital platforms (software-based products and systems) form the core of new venture ideas and market offerings. It manifests in two main typologies – Pure and Hybrid (Nzembayie & Buckley, 2022).

Pure digital entrepreneurship is a typology of entrepreneurship in which digital artifacts and platforms *solely* form the the core of new venture ideas and new market offerings. In contrast, Hybrid digital entrepreneurship is a typology of entrepreneurship in which digital artifacts and platforms combine with physical artifacts and tactile services to *jointly* form the core of new venture ideas and new market offerings. The difference with Hybrid traditional entrepreneurship is discussed in more detail later in the paper. However a defining difference between the two hybrid typologies is the degree to which the digital artifacts and platforms are core or peripheral to the new venture idea or market offering. In Hybrid traditional entrepreneurship, clearly the digital artifacts and platforms are more peripheral than core. In Pure traditional entrepreneurship

typologies then, digital artifacts and platforms play an insignificant or non-existent role in new venture creation.

Figure 1 – Typologies of Entrepreneurship in the Digital Age



Source: Nzembayie & Buckley, (2022).

But what is the significance of making distinctions between typologies of entrepreneurship in the digital age? Without critical distinctions, we risk arriving at misleading generalizations in research and offering the wrong advice to aspiring digital entrepreneurs (Giones & Brem, 2017). In fact, upon realizing that proposed traditional entrepreneurship models did not reflect practice in the digital age, digital entrepreneurs began to develop innovation models such as the Lean Start-up (Ries, 2011), Agile Development and its variants such as Scrum, XP and Kanban (Cohn, 2005), Customer Development (Blank, 2013) and Design Thinking (Brown, 2008), which more accurately speak to practice in their world. The academic world found itself playing catch up. To understand why, we must examine digital entrepreneurship as a separate genre (Nzembayie & Buckley, 2022). However to contextualise it appropriately, it is important to begin by identifying what is common to all forms of entrepreneurship.

Commonalities in all forms of Entrepreneurship

Entrepreneurship is a 'slippery concept' (Penrose, 1959) - a complex, multidimensional process whereby individuals initiate ideas and act to pursue them as opportunities, leading towards various outcomes (Casson, 1982; Shane, 2003). Action, called new venture creation, is central to this process. It leads to outcomes such as new market offerings – manifested in new products, new organizations, and new markets. Higher-level outcomes may also result in new societal norms and behaviours. New venture ideas are often externally enabled by changes in the environments in which entrepreneurs are embedded – changing technology, consumer behaviour, regulation, environmental and ecological conditions, and others. Entrepreneurs need not be fully aware of external enabling changes in order to initiate new venture ideas or to take action. Additionally, ideas are often motivated by the need to solve problems for segments of society through the creation of a product or service combination. Problems are often the needs and wants of consumers or customers. Given this problem-solution motive, the purpose of all productive forms of entrepreneurship is to create value for society (Baumol, 1996).

There are several moving parts in this conceptualization – hence the complexity. Two main concepts are of interest here: *New Venture Ideas* and *External Enablers* (Davidsson, 2015; 2021). These concepts in the entrepreneurship literature refer to the objective WHAT of most entrepreneurial processes.

How is Digital Entrepreneurship Different?

The New Venture Idea – Digital Artifacts & Digital Platforms as Core

The new venture idea is a major differentiator of various typologies of entrepreneurship. It is that on which entrepreneurs act. New venture ideas are metaphors for new market offerings. Digital entrepreneurship is uniquely differentiated by the fact that digital artifacts and digital platforms form the core of digital business ideas and market offerings. When something is core instead of peripheral to an entity, it means that entity cannot exist without it.

Digital artifacts is a collective term for software-based products and objects. By 'software-based,' we mean software itself, such as mobile and desktop applications, Artificial Intelligence and machine learning algorithms, and more. It also refers to by-products of software such as media content and other types of digital content such as eBooks, infographics, and the rest. Meanwhile, a digital platform is a software-based system designed to host complementary offerings. Digital platforms are matchmakers. They match producers and consumers.

When entrepreneurship is based on the creation of software-based products and services, the HOW of traditional entrepreneurship gets upended. In fact, many business schools continue to teach entrepreneurship with underlying assumptions of the creation of physical and tactile offerings – with their corresponding spatial and temporal limitations. Such spatial and temporal constraints are seen to impose rigidity and undue linearity on entrepreneurial processes. However, when software-based offerings form the core of entrepreneurship, those limitations either evaporate or are greatly minimized. For these reasons, we need to place digital entrepreneurship in its own category and examine it differently (Nzembayie et al., 2019.)

The reasons for this distinctiveness can be explained by examining the characteristics of software-based objects and their implications for new venture creation. As we shall see, these characteristics translate into agility and extreme flexibility in new venture creation, which are possible but less feasible when creating physical products and tactile services. It, therefore, questions our core logic of how to bring such products and services to market and what constitutes success (Nzembayie et al., 2019). For instance, do you begin new venture creation with a deliberate business plan or experiment towards an emergent one?

Software-Based Offerings and Implications for Digital Entrepreneurship

Software-based products are digitized goods and services.

By this, we mean they exist merely as bits of data in the form of ones and zeroes. Digitized goods are highly *modifiable* and instantly *distributable* over cyberspace. Together, these characteristics allow products and services to remain incomplete by design and subject to infinite expansibility. It explains why your software-based products tend to have an endless number of updates – Windows 8, 9, 10, 11, and so on. Also, software-based content such as eBooks or videos can be continuously edited, updated, and distributed at will over the internet. Compare that to a physical book or print media, which, once printed, is hard to edit and publish without significant costs. Physical products lack such extreme modifiability. Plus, they also are burdened with 'the tyranny of distance' – i.e., they need to be stored and shipped, and this also takes time and added costs. Compared to software-based offerings, the result is limited flexibility regarding how new venture creation can unfold and how business models can be innovated.

Digitized goods are also decomposable and re-combinable.

This is a product of the extreme modularity and granularity of the technology and its standardized protocols. Extreme modularity and standardization allow software-based components to be broken down into the tiniest possible bits and then re-combined later to form a finished product. This decomposability and re-combinability allow multiple participating actors to co-create a product concurrently. Furthermore, since decomposed components can be instantly distributed over cyberspace, multiple participating actors can create a software-based product at a time that suits their availability. The result is extreme agility, flexibility, and dynamism in new venture creation, unlike traditional entrepreneurship, based on the creation of physical and tactile offerings. Such instant, location-independent, and geographically dispersed co-creation supported by digital infrastructures (more on this later) enable digital entrepreneurs to concurrently enact new venture creation at velocities not observed in traditional forms of entrepreneurship.

Software-based goods are also characterized by non-rivalry.
Non-rival goods can be consumed by many people simultaneously without being depleted. When you watch a YouTube or Netflix video, for instance, multiple people watch at the same time, yet the video is not being used up. This is an example of non-rivalry in action. Moreover, non-rival goods can be reproduced at nearly zero marginal cost. By contrast, physical goods such as a car and even your cup of coffee can only be consumed by a limited number of people at any given time. Non-rival goods may even get better as they are consumed as virality enhances their value. The more people watching the 'Despacito' video by Lius Fonsi on YouTube, the more valuable it gets (over 7.7 billion views as of this moment!) – more on network effects later. Similarly, the value of a digital platform improves when consumed. Software-based products never expire or perish like your groceries or medication.

What the non-rivalry of digitized products offers entrepreneurs is extreme flexibility in business model innovation. We are all familiar with the 'freemium' model - where many software-based products are given away for free as part of a business model that captures revenue from advertising and other models. Try giving away too many free copies of your physical products, and you will soon be out of business. Physical products are characterized by rivalry and expensive costs of reproduction, storage, and distribution. Thus, the economics of physical products, unlike software-based products are different, leading to differences in business models and limitations on business model innovation. Furthermore, since software-based products are usually knowledge-intensive, costs tend to tilt in the direction of acquiring or coordinating individuals with relevant software-based knowledge and skills – programmers, graphic designers, digital marketers, and more.

Software-based products are traceable and interactive.
Traceability is the ability to find digitized goods over cyberspace. This is usually done by specialized software-based products such as search engine algorithms. Search engines such as Google and Bing interact with, trace, and locate digital artifacts across the internet. Interactivity allows functions of digital artifacts to be activated without changing their underlying code. These characteristics together, assist in unlocking their value through data-driven operations. Similarly, human users can interact with digitized goods without changing their source code. For instance, when playing a computer game, you interact by dragging and dropping objects and so on. Usually, every interaction leaves a digital trail that can be traced, tracked, and analyzed. Data logs may reveal the journey a digital object takes through cyberspace and how it has been used. Traceability and interactivity are, therefore, the reason digitized products promote data-driven operations, which can unlock more value than the sale of standalone software. This, in turn, translates into flexibility in business model innovation that creates and captures more value. Typically, physical products are hard to trace once distributed. As such, their value creation potential gets limited to a single service and single transaction. Unless we turn them into smart connected products such as IoT devices. So valuable are the characteristics of software-based products that hybrid typologies of digital entrepreneurship increasingly seek to merge software and hardware to create 'smart' connected products that unlock greater value. Think about how your smart grid and smart metering help optimize electricity consumption and reduce waste.

The characteristics of digitized goods and their implications outlined above, challenge our assumptions of new venture creation and performance. Speaking of performance, other metrics relating to network effects become more important at early phases than traditional growth KPIs such as profitability, break-even, and the number of employees. Network effects refer to the idea that the value of a service is enhanced by the number of people consuming it. If you were the only one with a phone, that phone's value will be greatly diminished. Indeed, network effects drive some 70 per cent of the value of software-based companies. Facebook, for instance, derives much of its value from the over 2.7 billion active monthly users accessing the service. Data-driven value allows advertisers to target potential customers with pinpoint accuracy. The value for advertisers is the reduction in marketing costs and a potential higher return on investment (ROI). Consequently, growth in user base leading to positive network effects is often more of a priority than profitability at early stages, with the software being used as bait to gain traction. Companies such as Amazon and Uber grew their user base unprofitably for several years before turning a profit. Moreover, with disruptive innovations, first-mover advantage and market dominance are critical to ensuring that future profits can be harvested. Indeed, the digital environment promotes winner-take-all market dynamics. Digital marketing skills become critical to driving venture growth through network effects. Therefore, the skills we emphasize in digital entrepreneurship education also need to be carefully considered (Nzembayie & Buckley, 2022).

Digital Infrastructures as External Enablers

Now let's turn to that other important concept in all forms of entrepreneurship called *External Enablers* (Davidsson, 2015). They are the result of changes in the environment that have the capacity to elicit a response from discerning actors. So digital entrepreneurs create and distribute software-based products. But software-based products cannot be created without enabling digital tools and systems. Digital infrastructure is the collective term for several enabling technologies such as the internet, broadband, 5G networks, microprocessors and storage, cloud computing and computing devices, and open technical standards. They are the primary external enablers of digital entrepreneurship. However, they are also external enablers of all typologies of entrepreneurship in the digital age. Today, almost every business is enabled by computers and the internet, but that does not automatically suggest that they are digital ventures. Of particular interest today is the role of cloud computing as a primary infrastructural enabler of current and next-wave digital entrepreneurship. It is one technology change that has truly democratized access to critical computing resources which were previously beyond the reach of under-resourced digital entrepreneurs. There is more to talk about on this subject later in the paper, but we move on now to discuss hybrid typologies of entrepreneurship.

Hybrid Typologies of Entrepreneurship in the Digital Age

Hybrid typologies do blur the lines between pure digital and pure traditional forms of entrepreneurship. Software is indeed eating up the physical world. We identify two main hybrid typologies of entrepreneurship in the digital age – hybrid digital and hybrid traditional. Hybrid digital entrepreneurship combines software-based products with physical artifacts and tactile services to jointly form the core of new venture ideas and market offerings. Your smartwatch, such as Fitbit, Garmin, and similar IoT (Internet of Things) devices, make good examples of new ventures that emerged under this typology. Likewise, we have services such as Deliveroo and Just Eat in the food industry. These ventures are digital platform-based innovations that tightly couple a software-based service with a physical operation of food delivery which jointly forms the core market offerings.

As for hybrid traditional entrepreneurship, there is a subtle distinction in terms of the significant but peripheral development of software-based products, which mainly enhance the core traditional offering. For example, the traditional bank has leveraged software-based products such as a banking app and platform to deliver operational efficiencies for itself and its customers in a significant way. Similarly, a conventional technology such as a car has today been enhanced significantly by software-based services such as Android Auto and Apple Car Play, as well as AI-powered driving assistants. In these examples, the software-based component is significant but remains peripheral – meaning, without it, the essence of the core product remains intact. At the end of the day, your Tesla Model Y or S is still fundamentally a car in spite of the significant software 'bells and whistles'. But when cars become fully autonomous, will that be hybrid digital or hybrid traditional entrepreneurship?

Under hybrid traditional and pure traditional forms of entrepreneurship, the main research interests include digital transformation and digital disruption. Such transformation is the result of software-based products 'eating the world' (Anderssen, 2011). Today's digital new venture ideas are increasingly motivated by the need to develop and apply software-based solutions to existing traditional industries, thereby rendering them more efficient. There are all sorts of implications for the economy and society, which opens up new avenues for research. Take Uber as an example – a software-based new venture sets out to render more efficient, the process of hailing a ride, and an entire market system gets upended as a consequence. Even our vocabulary is changing. We no longer 'grab a cab', we 'grab an Uber'. Likewise, we 'google', not just search online. Digital entrepreneurship has far-reaching consequences for society, making it paradigm-shifting and therefore research-fertile (Nzembayie & Buckley, 2022).

Summary and Conclusion

In this paper, we have set out to conceptualise digital entrepreneurship by unravelling the complexities of entrepreneurship in the digital age. More importantly, we demonstrated how digital entrepreneurship differs from other typologies of entrepreneurship. In sum, digital entrepreneurship is new venture creation based on software-based products and services. However, like all forms of entrepreneurship in the digital age, it is externally enabled by digital infrastructures such as the internet and computing capabilities. By unbundling the role of the different types of digital technologies in entrepreneurship, conceptual fuzziness has gives way to

much-needed clarity. As such, our framework, based on our research, gives academics and practitioners alike, an accessible approach to understanding the digital entrepreneurship phenomenon.

References

Anderssen, M., (2011). Why software is eating the world. Wall Street Journal, 20, C2

Ashton, K. (2015). *How to fly a horse: The secret history of creation, invention, and discovery*. Anchor.
.

Baumol, W.J., (1996). Entrepreneurship: Productive, unproductive, and destructive. *Journal of business venturing*, *11*(1), pp.3-22.

Blank, S., (2013). Why the lean start-up changes everything. *Harvard business review*, *91*(5), pp.63-72.

Brown, T., (2008). Design thinking. *Harvard business review*, *86*(6), p.84.

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company.

Casson, M. (1982). The entrepreneur: An economic theory. Rowman & Littlefield.

Cohn, M., (2005). *Agile estimating and planning*. Pearson Education.

Davidsson, P., (2015). Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization. *Journal of business venturing*, *30*(5), pp.674-695.

Davidsson, P., (2021). Ditching discovery-creation for unified venture creation research. *Entrepreneurship Theory and Practice*, p.10422587211030870.

Giones, F., & Brem, A. (2017). Digital technology entrepreneurship: A definition and research agenda. Technology Innovation Management Review, 7(5), 44-51

Kraus, S., Palmer, C., Kailer, N., Kallinger, F. L., & Spitzer, J. (2018). Digital entrepreneurship: A research agenda on new business models for the twenty-first century. *International Journal of Entrepreneurial Behavior & Research*.

Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship theory and practice*, *41*(6), 1029-1055.

Nzembayie, K. F., Buckley, A. P., & Cooney, T. (2019). Researching pure digital entrepreneurship–A multimethod insider action research approach. *Journal of Business Venturing Insights*, *11*, e00103.

Nzembayie, K.F., & Buckley, A.P. (2022). *Digital Entrepreneurship: Disruption and New Venture Creation*. Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.
https://venturingdigital.com/

Pnrose, E.T. (1959). *The theory of the growth of the firm*. Oxford: Oxford University press.

Ries, E., (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. Currency Books.

Schwab, K. (2017). *The fourth industrial revolution*. New York, NY: Currency books.

Shane, S.A., (2003). *A general theory of entrepreneurship: The individual-opportunity nexus*. Edward Elgar Publishing.

Ulhøi, J. (2021). A Digital Perspective on Entrepreneurship. *Journal of Innovation Management*, *9*(3), 71-89.