Ownership and Information Technology (Hardware, Software):

Dispossession Tendencies with the Help of IT

Term paper

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1 Introduction

The technological revolution has propelled the world into an era of continuous change, altering societal structures and creating a new paradigm for communication, interaction, business transactions, and the concept of ownership. The phenomenon of digital transformation signifies this shift from the tangible to the virtual realm, profoundly impacting the traditional models of property rights and ownership.

In the context of this technological metamorphosis, Information Technology (IT) emerges as the leading agent of change, triggering a radical reevaluation of ownership models that have long been anchored in the physical realm. Historically, ownership implied absolute control and possession of a physical entity—a home, a vehicle, a book, a piece of clothing. However, the advent of IT has infused these concepts with additional layers of complexity, challenging the conventional parameters of ownership.

The core investigation of this paper is situated at the complex intersection of IT and ownership, dissecting how digital potentialities are reshaping long-standing principles of ownership and property rights.

This transformation is evident across a broad spectrum of products and services, from shifts in software, to hardware devices infused and designed to function within the confines of proprietary software. In all these scenarios, traditional ownership models are being redefined and reshaped by the imperatives of digital technology.

This paper aims to delve into the nuances of this ongoing transformation, dissecting its implications for businesses, consumers, and societal norms at large. By examining real-world case studies and contemplating potential future scenarios, this paper aims to enrich the discourse on digital ownership and contribute to a holistic understanding of the changes instigated by the digital revolution.

1.1 Background & Context

In the past few decades, Information Technology (IT) has catalyzed unprecedented change across every facet of human life. These shifts have revolutionized communication, work, education, ultimately reshaping our relationship with the world around us. This study focuses on a particularly fascinating aspect of this shift: the transformation of traditional ownership models.

The evolution of digital technology, however, has blurred traditional clearly delineated lines in ownership. In the digital age, the process of purchasing often involves acquiring products that remain partially under the control of the sellers, fostering a dynamic shift in the understanding of ownership.

This shift from tangible to intangible goods—from CDs to music streaming services, DVDs to Netflix, physical books to eBooks—has instigated a seismic shift in the traditional conception of ownership. When purchasing a book, for example, ownership is clear and absolute. However, when buying an eBook or subscribing to a digital service, consumers effectively acquire a license to access content under predefined conditions—a significant departure from traditional ownership models.

In parallel, hardware products have also undergone a transformative journey. Devices are increasingly tied to proprietary software, limiting personal and third-party courses of action. Licensing agreements can restrict an owner's ability to modify or repair products. Furthermore, manufacturers can exercise control over product updates, as observed with companies such as Tesla among others, whose software-dependent vehicles are subject to routine updates controlled by the company.

IT's role in redefining traditional ownership models is apparent, and while the implications of these shifts are extensive, they are not yet fully transparent. A detailed investigation into this evolving landscape is both timely and critical. This research will explore the intricate relationship between IT and ownership, examine the disruptions in traditional ownership models, and investigate the implications for consumers and businesses.

1.2 Research Objectives

In the current digital milieu of the 21st century, conventional comprehension of property and ownership is undergoing rapid transformation. The emergence of digital goods and services has engendered new ownership models that significantly deviate from conventional paradigms. Consequently, it becomes crucial to comprehend and dissect these emerging frameworks. This research aims to illustrate the intersections of IT and ownership, emphasizing particularly the disruption of traditional models by IT and potential implications for businesses and consumers.

The first objective of this research is to understand the transition from traditional to digital ownership models. This will involve an investigation into the contributing factors, the unique characteristics of emerging models, and how they differ from traditional ones. As a part of this, a literature review will be conducted to establish a foundational understanding of traditional and digital ownership models, as well as exploring the concepts of exclusivity, permanence, and transferability - key tenets of traditional ownership - in the digital context.

The second objective involves the analysis of specific case studies to identify trends and patterns in the disruption of traditional ownership models by IT. These case studies will focus on the software and hardware sectors, representing the scope of this study. Selected examples include Microsoft's transition to a subscription-based model, Adobe's Creative Cloud, media streaming services like Netflix, Spotify, Apple Music, and hardware instances featuring Apple's ecosystem and repair restrictions, the automotive industry with Tesla, BMW, Mercedes-Benz, and the gaming industry with Microsoft Xbox, Sony PlayStation, and Nintendo. These cases, while comprehensive, do not cover the full breadth of the digital industry and are limited by the unique approaches to ownership across different sectors and businesses.

Another key objective is to explore the implications of these evolving ownership models for consumers and businesses. This exploration will focus on understanding how shifts in ownership models impact consumer rights, responsibilities, and overall experiences. The challenges and opportunities

these trends present for businesses, particularly concerning strategy, competition, and customer relationships, will also be examined.

The final objective of this research is to predict future trends in digital ownership. While the digital landscape is volatile and unpredictable, the study will attempt to extrapolate from current trends to project future trajectories. This will take into account potential technological advancements, shifts in consumer attitudes, and long-term implications for businesses and policymakers.

2 Literature Review

2.1 Traditional Ownership Models

The classical paradigm of ownership is inextricably linked to the tangible realm, often associated with physical objects and real estate. Philosophically, this echoes the theory of John Locke, who espoused labor as the source of property rights, emphasizing that individuals who put work into land or objects thereby acquire a right to the fruits of their labor (Locke, 1967). Samuelson (2003) provides an in-depth examination of these conventional models of ownership, emphasizing that the owner has the legal right to control, use, transfer, or sell an object.

In the vein of David Hume's "Of justice and injustice", the rights associated with the object are exclusive, meaning that they belong only to the owner and prevent others from using the object without the owner's explicit consent (Hume, 1739-40/2009). The owner, therefore, has the power to decide how, when, and by whom his or her property is used. This exclusivity, akin to Hegel's 'Personality Principle,' which postulates the need for property for the development of personality (Hegel, 1821), establishes the owner's supremacy in decision making related to his property, giving him considerable power and control.

Honoré (1961) further elaborates on the absolute and perpetual nature of property under traditional models, aligning with Locke's notion of the 'enough

and as good' provision, asserting that one may only appropriate as much as leaves enough for others. The owner's rights do not diminish over time and continue even after the owner's death, usually passing to the owner's heirs or assigns.

The transferability of traditional property models underscores Hume's 'transference by consent' rule. Honoré (1961) emphasizes that the owner has the right to delegate his property rights to another person, either temporarily (as in a lease) or permanently (as in a sale). This right to transfer property rights plays a crucial role in transforming property into a form of capital, a topic that (Cropf, 2008) discusses extensively in his book.

Pistor's (2019) exploration of property rights as bundles of rights re-emphasizes Hume's notion of the utility and conventionality of property, reinforcing the multifaceted nature of ownership and its capacity for capitalization.

However, Lessig (2001) argues that the digital revolution, in its defiance of the tangibility and exclusivity inherent in traditional models, is challenging these age-old norms. This misalignment has led to what Lessig (2001) describes as a "hybrid economy," where traditional and digital ownership models coexist, often creating tension and clashes. As hinted by Zittrain (2008), the openness and flexibility of digital assets present a stark contrast to traditional ownership norms and pose challenges to established legal and economic structures.

2.2 The Digital Transformation of Ownership

The shift from physical to digital has profoundly reshaped traditional notions of ownership. One of the critical factors influencing this change is the shift from tangible to intangible goods. In the physical world, items such as books or CDs exist in a singular form. These physical items are limited by their spatial existence and are subject to wear and tear, embodying certain inherent limitations of traditional ownership models (Zittrain, 2008). Digital goods, on the contrario, can be duplicated infinitely without loss of quality, allowing for widespread distribution. This potential for replication fundamentally alters the concept of exclusivity that has been central to traditional ownership.

The digital age has also brought about a shift in the understanding of what it means to purchase a digital good. Consumers often do not purchase ownership of a product, but rather a license to use it (Samuelson, 2003). These licenses, often encapsulated in End User License Agreements (EULAs), define the terms of use and can significantly limit the rights associated with traditional ownership, such as sharing, modifying, or reselling the product.

Ghosh (2008) introduces the concept of "licensed property," where customers pay for access to a product but never own it in the traditional sense. This model facilitates intellectual property markets where exclusivity is controlled by the licensor, who retains substantial control over the product even after the sale. This phenomenon has been strongly observed in the software domain, where the software-as-a-service (SaaS) model has replaced the traditional practice of purchasing a physical copy of software with a subscription-based access model (Bessen, 2017).

Hardware has not been immune to the digital transformation of ownership. Zittrain (2008) highlights that smart devices, from phones to cars, are increasingly designed to run on proprietary software. This linking of ownership of physical goods with digital licenses can challenge consumers' traditional rights to modify, repair, or resell these goods, as these rights may be restricted by the software's EULA.

As a result, the digital age is reshaping the notion of ownership, moving away from traditional models and toward new paradigms that better reflect the unique characteristics of digital goods and services. This shift has significant implications for both consumers and businesses, with the potential to evolve as technologies continue to advance and digital goods become even more integral to everyday life.

2.3 Dispossession Tendencies in Information Technology

In the rapidly evolving digital landscape, a key feature shaping the shift in ownership and control is the pronounced trend toward dispossesion. This shift, predominantly from users to creators, platforms, or service providers, is subtly woven into the terms of use, licensing agreements, and proprietary systems that govern digital spaces (Zittrain, 2008). While this trend fosters innovation and opportunity, it also maps out a challenging terrain for consumers, businesses, and the broader digital economy to navigate.

Central to this trend of digital dispossesion is the shift from product-based to service-based models. This paradigm shift is evident in the rise of software-as-a-service (SaaS) and platform-as-a-service (PaaS) offerings. Instead of maintaining full ownership and control of a product, customers now pay for access to or use of these services over time (Bessen, 2017). This shift has effectively redefined the notion of ownership and posession.

In parallel with the shift to service-based models, customers often find themselves bound by terms of use imposed by service providers. These terms and conditions, often buried in lengthy and complex agreements, dictate the do's and don'ts for customers, effectively limiting the rights traditionally associated with outright ownership (Samuelson, 2003).

A simultaneous development is the rise of 'walled gardens' or proprietary ecosystems. Companies such as Apple and Amazon have carefully constructed ecosystems in which the boundaries between hardware, software, and digital content tend to blur. The companies maintain tight control over these ecosystems, often restricting users' ability to modify their devices, use non-proprietary software or hardware, or transfer digital content, thus shrinking the traditional sphere of user control (Zittrain, 2008).

Hardware manufacturers also contribute to the dispossesion trend. By integrating proprietary software into their devices, manufacturers can effectively limit users' ability to modify or repair their devices.

The impact of this shift towards a more fragmented form of ownership has both positive and negative implications. From one perspective, it offers consumers a cost-effective and convenient way to access a wide range of content and services. However, on the flip side, it places more power and control in the hands of corporations and service providers, leading to potential consumer disadvantage in terms of long-term cost, reduced consumer rights, and potential loss of access to purchased digital goods.

Furthermore, the aspect of psychological ownership in the digital realm, where feelings of ownership are shaped by affordances and interactions, is also intertwined with dispossesion tendencies. While users may feel a sense of ownership over digital goods and spaces they interact with, this often stands in stark contrast to the legal reality where platforms or service providers retain ultimate control (Pierce et al., 2001; Belk, 2014).

Finally, the challenges associated with governing digital commons also tie into the trends towards digital dispossesion (Hess & Ostrom, 2007). As the dispossesion of digital assets becomes more prevalent, these governance challenges become more complex and intertwined with broader issues of digital rights and digital equity.

Expropriatory tendencies in the digital realm are not without implications. They are a double-edged sword. On the one hand, they foster innovation, optimize user experiences, and enable the emergence of new business models. On the other hand, they raise concerns about consumer rights, market competition, and digital equity. Striking a balance between these opposing forces, between fostering innovation and protecting the rights and interests of stakeholders, will be an ongoing challenge as the digital age continues to unfold.

3 Case Studies

3.1 Software

3.1.1 Office Software: Microsoft Office 365 Subscription Model

The shift from traditional ownership models to digital frameworks is remarkably visible in the software industry, most notably exemplified by Microsoft's transition from outright sales of software products to a subscription-based model for its Office 365 suite. This case study examines this transition, the motivations driving it, its consequences for consumers and businesses, and its implications for future frameworks of software ownership.

Background

Microsoft Office has been an essential component of productivity software, encapsulating applications such as Word, Excel, PowerPoint, and Outlook. Historically, Microsoft sold its Office software as a "perpetual" license, meaning that customers paid a one-time fee to purchase the software and could use it indefinitely (Bessen, 2017). However, in 2011, Microsoft introduced Office 365, shifting to a subscription-based model that required customers to pay a recurring fee to use the software.

Drivers of the Shift

Several key factors drove Microsoft's shift to a subscription model. From a business perspective, the subscription model provides a predictable and ongoing revenue stream, as opposed to one-time sales, which contributes to the company's financial stability. In addition, the subscription model enhances customer retention, as subscribers tend to stay with a product for an extended period of time, resulting in increased lifetime customer value (Bessen, 2017).

Technological developments have also catalyzed this shift. The advent of cloud computing and high-speed internet facilitated the delivery of software over the internet, bypassing the need for physical distribution and allowing for the efficient implementation of a subscription model. In addition, offering software as a service allows Microsoft to provide regular updates and enhancements, thereby increasing the value proposition to customers.

Implications for Consumers

The move to a subscription model presents a dichotomy of implications for consumers. On the one hand, customers benefit from continuous updates and enhancements, ensuring that they always have access to the latest features and security updates. The subscription model also democratizes software accessibility by reducing upfront costs, as subscriptions typically have lower monthly or annual fees than outright software purchases. Conversely, the subscription model also implies a forfeiture of certain traditional property rights. Subscribers no longer own the software in the traditional sense; instead, they pay for the right to use it. Consequently, if they stop paying, they lose access to the software. In addition, subscribers are often bound by the terms and conditions of the subscription, which may restrict their use of the software (Samuelson, 2003).

Implications for Businesses

The move to a subscription model has profound implications for businesses, both from the perspective of software producers and users. For vendors, the subscription model can provide more predictable revenue and foster closer customer relationships due to the ongoing nature of subscriptions. However, moving to this model requires significant changes in business processes, pricing strategies, and customer relationship management. For enterprise software users, the subscription model provides flexibility by allowing them to add or remove licenses based on their current needs. However, it also introduces a new recurring cost into their operations, as opposed to the one-time cost of purchasing software under the perpetual license model.

Conclusion

The future of software ownership Microsoft's move to a subscription model for Office 365 is a microcosm of the larger trend in the software industry toward service-based models. This transition is radically changing the concept of software ownership, moving away from software as a product that customers own to software as a service that customers consume. As this transition

continues, it is critical to consider the implications for consumer rights, business models, and the broader digital economy.

3.1.2 Media Software: Adobe Creative Cloud

The shift from traditional software ownership to service-based models in the software industry is well represented by the transformation of Adobe Systems Incorporated. The multinational computer software company migrated from selling physical software products to providing its software suite through the Adobe Creative Cloud subscription model.

Background

Adobe Systems has been an influential player in the software industry for many years, with a range of software extensively used in fields like graphic design, web development, video editing, and more. Adobe Photoshop, Adobe Illustrator, and Adobe Premiere Pro, traditionally sold as standalone products or as part of suites requiring a one-time purchase, are some of its renowned applications. In a strategic move in 2013, Adobe pivoted away from physical software sales and instead introduced the Adobe Creative Cloud, a cloud-based subscription model.

Drivers of the Shift

The transformation to a subscription model was driven by several factors. Primarily, advancements in technology played a significant role. The rise of high-speed internet and cloud technologies made it possible to distribute software over the internet, eliminating the need for physical software packages and setting the stage for a subscription-based model (Fisher, 2018).

From a business perspective, the subscription model offered several benefits to Adobe. It yielded a steady and predictable revenue stream, thereby promoting financial stability. Furthermore, it gave Adobe greater control over software distribution, which helped combat software piracy, a major issue in the industry. The subscription model also provided Adobe with extensive user data, enabling the company to refine its products and improve its overall business strategy (Bessen, 2017).

Implications for Consumers

The introduction of Adobe Creative Cloud had diverse implications for consumers. While the subscription-based model reduced upfront costs and provided regular updates, thereby enhancing software accessibility and usability, it also led to a significant departure from the conventional software ownership paradigm.

In the new model, consumers no longer owned the software; instead, they rented the software on a monthly or yearly basis. This introduces a level of dispossesion, as discontinuing the subscription means losing access to the software. Furthermore, customers became subject to the terms and conditions of the subscription agreement, which often imposed restrictions on software usage, potentially limiting the freedoms previously enjoyed under the traditional ownership model (Samuelson, 2003).

The transition to a subscription model ushered in a new era where data and IT enablers played a significant role in the software industry. With the use of cloud-based services, Adobe could collect extensive data on customers' usage patterns, offering valuable insights to improve their products and customer service. In 2023, Adobe introduced another leap forward with the launch of its Adobe Photoshop Beta generative AI. However, there was a lack of transparency in the training data used for the model training.

Implications for Businesses

The shift to a subscription model had significant implications for businesses as well. For software producers like Adobe, the subscription model necessitated changes in various business processes, such as pricing strategies, accounting methods, and customer relationship management. Furthermore, the need to support the cloud-based service model required substantial investments in IT infrastructure.

For businesses using the software, while the subscription model brought about increased flexibility in scaling their software needs, it introduced a recurring operational cost in contrast to the one-time expense of purchasing software outright.

Conclusion

The shift from traditional ownership to a subscription-based model, as exemplified by Adobe Creative Cloud, presents intriguing implications for the future of software ownership. This shift underscores a trend where software is increasingly viewed as a service rather than a product.

3.1.3 Media Streaming: Netflix and Apple Music

The advent of digitalization has drastically reshaped ownership models within the media and entertainment industry, shifting the consumption of content from the physical or digital purchase to a subscription-based access model. The transition is exemplified by the rise of streaming giants like Netflix for video content, and Apple Music for audio content.

Background

Traditionally, consumers purchased and owned individual pieces of media — tangible formats like books, CDs, DVDs, and later, digital files such as MP3s. Apple's iTunes, launched in 2001, epitomized this digital transition by allowing users to buy, download, and own individual songs and albums in the form of digital files. This gave consumers the flexibility to build their personalized music libraries, mirroring the act of owning physical music albums, but in a digital space.

However, this model has been significantly disrupted by the advent of streaming services. Instead of buying and owning individual pieces of media, consumers now pay for access to expansive libraries of content. Netflix, originally launched as a mail-order DVD rental service in 1997, started streaming movies and television shows in 2007, gradually shifting its primary business model to streaming. In the music industry, a similar transformation has occurred, spearheaded by services like Apple Music, launched in 2015. These platforms offer access to vast music libraries for a monthly fee, challenging the traditional paradigm of buying and owning music, even in its digital form.

Drivers of the Shift

The primary drivers behind this transition to streaming have been the widespread availability of high-speed internet and advancements in cloud technology. These technological enablers have made it possible to stream high-quality audio and video content on demand, fostering the emergence and growth of platforms like Netflix and Apple Music. For these companies, the streaming model, like the software subscription model, provides significant business benefits. Recurring subscription fees generate a predictable and stable revenue stream, offering financial stability and driving business growth (Bessen, 2017).

Implications for Consumers

The shift to streaming has substantial implications for consumers. The new model offers convenience and choice with access to vast content libraries and personalized recommendations. However, it also represents a significant departure from traditional notions of ownership.

In the streaming model, consumers no longer possess the content they pay for but merely have access to it. Their 'ownership' is thus temporary and subject to the continuity of their subscription. The ephemeral nature of this access is further complicated by changes to content availability due to licensing agreements; movies, shows, and music tracks can be removed from platforms, depriving consumers of content they had access to (Lessig, 2001). Moreover, geographic restrictions sometimes limit access to certain content in specific regions, limiting the true 'freedom' of ownership. Sharing content with others also becomes complicated, as it's often limited to individuals who subscribe to the same service, or even specific subscription plans within the same service.

Implications for Businesses

From the perspective of artists, the advent of streaming presents a mixed bag of opportunities and challenges. On the one hand, streaming platforms have democratized access to a global audience. Artists can now reach listeners worldwide without the need for physical distribution, a development that has

particularly benefited emerging artists and independent creators. Furthermore, successful negotiation of contracts with labels and platforms can lead to substantial revenue from streaming, especially for popular artists.

On the other hand, compensation models for artists in the streaming era often present challenges. Payments from streaming services, typically based on the number of streams, may yield significantly lower income compared to traditional sales models (Zittrain, 2008). The revenue distribution also tends to be influenced heavily by contractual agreements with labels, which can vary widely. For less-established artists or those without strong negotiation power, this might result in lower earnings.

Conclusion

The rise of streaming services represents a profound shift in media ownership. As consumers increasingly 'rent' access to content libraries rather than owning content, new complexities arise concerning consumer rights, content control, geographic restrictions, and sharing policies. As the digital landscape continues to evolve, businesses, consumers, and regulatory bodies will have to navigate these challenges and redefine the concept of ownership in the digital age.

3.2 Hardware

3.2.1 Consumer Electronics – Apple Ecosystem

In the landscape of digital hardware ownership, Apple Inc. provides a robust case study. Apple's integrated ecosystem, paired with its approach towards repair restrictions and proprietary software, represents a substantial shift in traditional ownership models. These practices illustrate broader trends within the information technology industry and their effects on hardware ownership.

Background

Apple, a leading player in the technology industry, is renowned for its range of devices, including the iPhone, iPad, and MacBook. A key facet of Apple's strategy is its tightly knit ecosystem, where software, hardware, and services are closely linked. This integration offers a seamless user experience across

devices while also allowing Apple to exert considerable control over its products' lifecycle.

Apple's ecosystem is built around its operating systems (iOS, macOS) and supported by services like the App Store and Apple ID. The App Store, for instance, is the exclusive source of apps for iOS devices, providing Apple with control over the applications available to users.

Moreover, Apple IDs, which are required to use Apple devices and services, further tie users into Apple's ecosystem. They're essential for accessing services like iCloud, making purchases from the App Store, and even for processes like device setup and data backup. This integrated approach keeps users within Apple's ecosystem, making migration to other platforms, like Windows or Android, potentially challenging.

Apple's approach to device repair significantly underscores their stringent control over hardware ownership. They have instituted specific measures that limit and discourage unauthorized repairs, encompassing both software and hardware restrictions.

Hardware-wise, Apple designs its devices, such as iPhones and Macbooks, in a way that makes user repairs and upgrades challenging. For instance, components like RAM and batteries are often integrated and not user-replaceable, in stark contrast to some other technology companies that allow users to easily upgrade or replace certain parts. Moreover, unlike some Android phones, Apple does not provide the option to expand storage via microSD cards, further limiting user control over their devices.

On the software side, Apple has also built mechanisms that can disable certain functionalities or flag warranty issues when repairs are done outside of their authorized service network.

Moreover, Apple's proprietary charger design, which differs from the widely adopted USB-C standard used by many other devices, can be viewed as another manifestation of its control strategy. This not only forces users to purchase chargers directly from Apple or licensed partners but also contributes to electronic waste.

These practices, which together establish what some refer to as a "repair monopoly" (Perzanowski & Schultz, 2016), represent a departure from traditional models of hardware ownership. Traditionally, consumers enjoyed the freedom to repair, modify, or upgrade their own devices without such restrictions. In contrast, Apple's practices have raised questions about what ownership means in the context of tightly controlled hardware and software ecosystems.

Implications for Consumers

Apple's repair restrictions and its ecosystem have several implications for consumers. While they can ensure high-standard repairs and a unified user experience, they also limit consumers' freedom with their devices. Post-warranty repair costs at authorized centers can be high, and difficulty in migrating data and services to other platforms can lead to higher device replacement rates, contributing to electronic waste.

Furthermore, Apple's ecosystem could limit software availability and compatibility. The exclusive nature of the App Store may restrict users from accessing certain applications not approved by Apple.

Implications for Businesses

Apple's strategies serve to protect their brand reputation, maintain device security, and promote new device sales. However, these practices have also faced criticism and legal scrutiny. In many jurisdictions, "right to repair" legislation is being considered, which would require manufacturers to enable easier device repairs for consumers and independent shops. Such legal changes could challenge Apple's current business model.

Conclusion

The Future of Hardware Ownership Apple's strategies regarding hardware and its ecosystem offer an insight into the evolving dynamics of ownership models. While these practices offer certain benefits, they also raise critical questions about consumer rights, software freedom, and sustainability.

3.2.2 Automobile Industry: Tesla, BMW and Mercedes-Benz

The automobile industry is in the midst of a transformative shift in ownership models, prompted by the advent of information technology. Auto manufacturers like Tesla, BMW, and Mercedes-Benz are pioneering this change by utilizing software to control and monetize a range of vehicle features.

Background

Automobiles, once purely mechanical devices, are increasingly transforming into sophisticated, connected devices due to the deep integration of software and internet connectivity. This is largely manifested in companies like Tesla, which champions this innovative fusion of software and analog engineering. With its over-the-air (OTA) software updates, Tesla vehicles aren't just cars; they're evolving platforms that can acquire new functionalities and improvements after purchase. This introduces a significant shift in how we perceive and experience vehicle ownership, effectively merging the digital and physical aspects of the product.

Tesla uses software to limit access to features like Autopilot functionality. This allows them to offer vehicles at a lower entry price, while requiring customers to pay additional fees to unlock these features, even though the necessary hardware already exists in the car (Bateman, 2021).

In 2022, BMW announced plans to implement software-locked features, such as heated seats and advanced driving aids, which consumers could activate post-purchase ("BMW introduces new heated seat subscription in UK," 2022). Later that year, Mercedes-Benz has joined the trend of offering subscription-based services for additional features in cars. The company plans to introduce an online subscription service in the US that allows owners of its electric vehicles to enhance acceleration for an annual cost of $1,200. This subscription feature, known as "Acceleration Increase," electronically boosts the motor output and torque (Mercedes-Benz to introduce acceleration subscription fee, 2022).

Implications for Consumers

In the context of connected and autonomous vehicles, data ownership and privacy become increasingly relevant. Car manufacturers can collect a vast

amount of data from their vehicles and use it for various purposes, including improving autonomous driving algorithms. However, this raises questions about data privacy and who ultimately owns this data.

Furthermore, manufacturers have the ability to remotely control or disable certain features or even the entire vehicle.

Licenses Software has also introduced complications in the resale of vehicles. When a car is sold, the question arises whether software licenses, especially those for additional, paid features, can be transferred. Manufacturers may require new owners to repurchase these features, adding another layer of complexity to the traditional concept of car ownership.

While the software-centric approach provides consumers with increased flexibility, allowing them to pay for only the features they need and upgrade their vehicle's functionality over time, it also challenges traditional notions of ownership. Consumers face questions regarding their rights to the software and data related to their vehicle.

Implications for Businesses

The shift towards software-controlled features and OTA updates presents new revenue opportunities for automakers but also invites challenges such as potential consumer backlash and regulatory scrutiny. In response, some jurisdictions have enacted "right to repair" laws requiring manufacturers to provide access to necessary mechanical data for repairs.

The move by BMW and Mercedes-Benz have sparked debate, with some critics arguing that buyers should not have to pay to remove software blocks on features that are already installed in their cars.

Conclusion

The software integration in automobiles is reshaping traditional ownership models, prompting complex questions around consumer rights, data privacy, and business practices. As this landscape continues to evolve, it is crucial for consumers, businesses, and policymakers to engage in dialogue about ownership rights and expectations in the digital age.

It's important to note that the use of software and data in vehicles raises intricate legal and ethical questions that are currently the subject of ongoing discussion among industry stakeholders, consumers, and lawmakers.

3.2.3 Gaming Industry: Microsoft Xbox, Sony Playstation and Nintendo

The gaming industry has also experienced a significant metamorphosis over the past decade, with the rise of digital distribution and subscription services reshaping the concept of ownership for both players and developers. This case study examines the shifts in ownership models in the context of Microsoft's Xbox, Sony's PlayStation, and Nintendo's platforms.

Background

Historically, gamers bought physical copies of video games, similar to other forms of physical media, like DVDs. This allowed them to play, lend, or resell games as they wished. However, with the advent of digital distribution and internet connectivity, this traditional ownership model has been dramatically transformed.

Today, all three major gaming platforms — Xbox, PlayStation, and Nintendo Switch — facilitate digital game purchases. Digital distribution enables players to buy games directly from their consoles, eradicating the need for physical discs. Nevertheless, digital games have restrictions: they can't be resold or loaned to friends, unlike their physical counterparts.

In addition to this, each of these platforms has launched subscription services: Xbox Game Pass, PlayStation Plus, and Nintendo Switch Online. These services, much like Netflix, focus on access rather than ownership. While subscribers can play any game in the library, their access is revoked once the subscription ends (Barrett, 2019).

Implications for Consumers

The transition towards digital distribution and subscription services has various implications for gamers. While it brings convenience, immediate access to new releases, and a cost-effective way to explore a variety of games, it also undermines some aspects of traditional ownership. Players lose the ability to

resell or lend digital games, and there's ongoing uncertainty regarding access to these games if the platform's servers shut down or the subscription expires (Poell et al., 2019).

Digital Rights Management (DRM) and Always-Online Further complicating the concept of ownership is the increased use of digital rights management (DRM) and always-online requirements. These technologies are used to prevent piracy and control access to games, but they can also restrict how players use their games. For example, some DRM schemes require players to be constantly connected to the internet, even for single-player games.

Implications for Businesses

For game developers and publishers, digital distribution eliminates manufacturing and distribution costs, allowing for a direct relationship with consumers. However, it also increases their dependence on platform holders like Microsoft, Sony, and Nintendo, who control access to the marketplace and often claim a considerable share of sales revenue.

Subscription services introduce a unique challenge: revenue models often depend on gameplay duration rather than units sold. This shift can influence game design and monetization strategies, possibly leading to a greater emphasis on "games as a service" models.

Secondary Market and Resale The rise of digital games has also impacted the secondary market. With physical games, players could resell or trade in their old games. Digital games, however, cannot be resold, which has led to a decline in the video game resale market.

Conclusion

The evolution of the gaming industry represents a critical shift from traditional ownership to access-based models in the digital age. This transition, underpinned by digital distribution and subscription services, offers immediate access and variety to gamers at the cost of certain ownership benefits, such as reselling and lending games. It also redefines business strategies for developers and publishers, emphasizing "games as a service" models, but simultaneously intensifies their dependence on platform gatekeepers. Thus, this trans-

formative landscape illuminates the complexities of ownership concepts in a digital context.

3.3 Discussion

The aggregate analysis of these diverse case studies reveals a profound transformation in the notion of ownership in the context of the information technology revolution. The software and hardware domains, despite their different characteristics, both provide substantial overlapping evidence of a trend in which control and traditional ownership rights are migrating from consumers to corporations.

In the software realm, we can see this in Microsoft's Office 365, Adobe's Creative Cloud, and a range of streaming services such as Netflix, Spotify, and Apple Music. They all illustrate the pivot from a one-time purchase model to a subscription-based model. This pivot has yielded companies a more predictable and recurring revenue stream, as well as the ability to control their products. While users benefit from potential cost savings and frequent updates, they must trade away the sense of ownership and control traditionally associated with software purchases.

For example, users of Microsoft and Adobe services no longer own a physical copy of the software; instead, they subscribe to access. The downside is that if the subscription isn't renewed, access is revoked. Similarly, with streaming media services, the vast library of content is available for consumption, but users do not own any of it. If they decide to cancel their subscriptions, or if a piece of content is removed from the service, access is lost.

In the hardware realm, the trends observed have also raised significant questions about ownership. The examples of Apple's ecosystem, Tesla, BMW, Mercedes-Benz, and gaming platforms such as Microsoft Xbox, Sony PlayStation, and Nintendo demonstrate a growing convergence between software and hardware.

In all of these examples, there is a common thread: companies are using digital technologies to move from ownership-based models to access-based

models. These models provide companies with new revenue streams and greater control over their products and services. At the same time, however, they challenge traditional consumer rights and notions of ownership, raising crucial questions about property and ownership in the digital age.

Several insights emerge from these case studies. First, they call for increased reflection among consumers, businesses, and policymakers about the meaning of ownership in the digital age. Companies should address the ethical and consumer relations implications of these new models. Consumers need to increase their awareness and critical understanding of the terms of service and end-user license agreements to which they agree. Policymakers may also need to consider modernizing regulations to protect consumer rights in the face of these rapidly evolving digital realities.

Second, the issue of data ownership and privacy has also emerged as a major concern. In both software and hardware, companies are accumulating vast amounts of user data, often with opaque policies on data use, storage, and sharing. This poses significant privacy and security risks to users and further complicates the concept of digital ownership.

Third, the shift in ownership models also has significant implications for secondary markets. Whether it's the resale of physical video games, used cars, or used Apple devices, the ability to resell or trade in products is an important aspect of traditional ownership models. The shift to digital and access-based models could therefore have a significant impact on these markets.

In summary, these case studies shed light on a complex and ongoing transformation in the concept of ownership. As digital technologies continue to evolve and shape society and markets, it's clear that the concepts of ownership and the rules and regulations that govern it will need to evolve as well.

4 Future Outlook

4.1 Emerging Technologies and Their Impact on Ownership Models

The steady advance of technology continues to reshape traditional notions of ownership, altering consumer rights and business revenue models in the process. This pervasive and persistent transformation prompts an essential examination of the potential impact of emerging technologies, such as blockchain, artificial intelligence (AI), and the Internet of Things (IoT), on ownership models. These technologies have the potential to further disrupt and redefine the concept of ownership in today's society.

Blockchain Technology

Blockchain technology, originally conceived and implemented as the backbone for bitcoin, has already begun to transform ownership models.

Smart contracts, characterized as self-executing contracts where the terms of the agreement are encoded in the contract itself, have the potential to catalyze entirely new forms of ownership models. For instance, the concept of fractional ownership, where a physical or digital asset could be jointly owned by multiple individuals. This model could potentially democratize access to goods and services that would traditionally be prohibitively expensive for a single individual to own outright (Mougayar, 2016). Smart contracts also facilitate more granular control over the rights and privileges associated with ownership. This technological innovation gives owners the flexibility to share, sell, or lease their assets with an unprecedented level of accuracy and specificity (Kshetri, 2017).

The emergence of NFTs illustrates the transformative potential of blockchain technology. NFTs can denote ownership of unique items or content in the digital realm (Werbach, 2017). This nascent technological solution provides artists and content creators with a method to sell digital artwork, music, and other forms of creative content directly to consumers. As a result, traditional copyright and ownership models in the creative industries are being disrupted. The emergence of NFTs provides a mechanism for verifying and transferring

digital ownership, which could have far-reaching implications across a multitude of sectors.

Artificial Intelligence (AI)

AI is another potent technology that is poised to reshape ownership models. As AI models continue to evolve in complexity and sophistication, discussions around ownership of these models and the data used to train them have become more prevalent. The situation becomes increasingly complicated when AI systems independently generate original content or make novel discoveries. In such cases, determining the rightful owner of the copyright or patent becomes a complex challenge. The adoption of AI in various sectors, such as entertainment, research, and manufacturing, is likely to complicate existing intellectual property laws and require the creation of new property frameworks tailored to the unique characteristics of AI.

Internet of Things (IoT)

The rapid penetration of IoT devices is a key enabler of the shift in ownership models. IoT encompasses the network of physical devices that are connected via the Internet, allowing them to exchange data and communicate with each other. Everyday household items such as refrigerators, thermostats, and speakers, which have been enhanced into "smart" devices through the integration of software and internet connectivity, fall within the IoT spectrum.

As the IoT expands, companies retain the ability to exert control over the functionality of devices after they are sold. For example, companies can deploy software updates that add new features or modify the operational behavior of the device, often without the explicit consent of the owner. In addition, these smart devices continuously generate data about their usage. This constant generation of data raises critical questions about data ownership and privacy. Should the data generated by a smart refrigerator, smart speaker, or wearable device belong to the consumer using the device or to the company that makes it? As the IoT continues to expand, society will be forced to confront and answer these questions.

In conclusion, the integration of emerging technologies such as blockchain, AI, and IoT is set to significantly disrupt traditional ownership models. This disruption presents both businesses and consumers with uncharted territory, creating new opportunities as well as significant challenges. Businesses, consumers, and policymakers will need to navigate this new landscape with deliberation, striving to strike a delicate balance between fostering innovation and protecting consumer rights and interests. It is an endeavor that will require extensive dialogue, cooperation and a shared understanding of changing notions of ownership in this increasingly digital world.

4.2 Potential Shifts in Consumer Attitudes and Behavior

As technology drives the evolution of ownership concepts, significant changes in consumer attitudes and behaviors are expected. Factors such as increased engagement with digital technologies, changing perceptions of value, and a growing emphasis on sustainability are among the key drivers of these changes.

The digital revolution has made technology a common and essential part of people's lives. As Millennials and Gen Z- the digital natives - become the dominant cohorts in the consumer market, their comfort with digital technologies is expected to accelerate the adoption of digital and non-traditional ownership models. This demographic's tech-savviness and digital fluency increase their willingness to eschew traditional physical ownership in favor of digital access, subscription models, or fractional ownership (Lutz & Hoffmann, 2017). This consumer behavior will inevitably affect the dynamics of ownership, potentially tilting it more toward usage rights and access rather than outright ownership.

The concept of value is undergoing a radical transformation in the minds of consumers. Consumers are increasingly showing a preference for access over ownership, driven by the perception that access-based models offer greater flexibility and cost-effectiveness. The rise of the sharing economy, epitomized by companies like Uber and Airbnb, where consumers choose to temporarily access goods or services rather than own them, illustrates this shift.

Subscription services such as Netflix, Spotify, and Office 365 represent a paradigm shift in consumer value perception from ownership of physical or digital goods to continuous access to services and experiences (Belk, 2014). This represents a significant transition from the traditional ownership model to temporary, access-based models that balance utility and affordability.

Privacy Concerns

As more products become connected and companies gain the ability to monitor and control product usage, consumer privacy concerns will become more apparent. Consumers may begin to weigh the convenience and benefits of connected, smart products against potential violations of their privacy and autonomy (Martin et al., 2022). As discussed in Section 4.1, with the rise of IoT devices, this issue will continue to be a critical determinant of consumer behavior.

Acquisition of new skills and literacies

The move towards complex, technology-mediated forms of ownership may require consumers to acquire new skills and competencies. For example, they may need to better understand terms of service agreements, manage digital assets, and navigate transactions facilitated by blockchain technology (Sundararajan, 2016). As technology continues to redefine ownership, digital literacy will become increasingly important to empower consumers to navigate these changes.

In sum, these shifts point to a future in which traditional ownership may become less common, replaced by alternative forms of ownership driven by evolving consumer attitudes and behaviors. The emergence of new technologies and societal trends will continue to shape these shifts. Understanding these changes is critical for companies to adapt their strategies and remain competitive in the future marketplace.

4.3 Implications for Businesses and Policymakers

The transition from traditional to digital ownership models is not just a shift in consumer preference. It has broader implications for businesses, policymakers, and society at large.

Implications for Businesses

For businesses, the transition to digital ownership models will affect several facets, from revenue generation and customer relationships to product development and competitive dynamics.

Revenue models

Traditional outright sales models may be replaced by subscription or service-based models that generate a recurring revenue stream. While these new models offer the promise of steady revenue, implementing them may require significant investments in technology infrastructure and a thorough transformation of business processes (Mouzas, 2021). Organizations must adapt to these changes to remain relevant and competitive.

Customer Relationships

The evolution of digital ownership requires ongoing customer engagement, as opposed to one-time transactions in traditional ownership models. Therefore, businesses may need to strengthen their customer service and support and develop long-term customer relationship management strategies (Kumar & Reinartz, 2012).

Product development

With the digitization of products and the emergence of networked systems, a software-oriented approach to product development is becoming increasingly important. Traditional hardware companies may need to acquire or develop new skills in software development, user experience design, and data analytics (Porter & Heppelmann, 2014).

Competitive dynamics

The transition to digital ownership has the potential to disrupt existing industry structures and competitive dynamics. Early adopters can gain a competitive advantage, while companies that are slow to adapt risk becoming obsolete. Moreover, the rise of digital platforms may lead to network effects and winner-take-all scenarios, resulting in greater industry concentration (Bessen, 2017).

Implications for Policymakers

Policymakers must also adapt to this changing landscape, as it raises several crucial legal, regulatory, and societal issues.

Intellectual property rights

Intellectual property laws may need to be revised to accommodate the digital transformation of property. A delicate balance must be maintained between protecting the rights of creators and allowing consumers to maximize the potential of their digital assets (Lessig, 2001).

Privacy and security

The widespread use of digital and interconnected devices raises concerns about privacy and security. Policymakers are tasked with developing regulations to protect consumer privacy and ensure the security of digital devices (Koops et al., 2017).

Consumer rights

The shift to digital ownership may require new consumer protection laws. These could regulate companies' post-sale control or restrictions on product use to ensure that consumer rights are not violated (Zittrain, 2008).

In summary, the ongoing shift toward digital ownership models has far-reaching implications for businesses and policymakers alike. Successfully navigating this changing landscape requires strategic foresight, innovation, and the courage to challenge established norms. Businesses will need to adapt their strategies, build new capabilities, and adopt new business models. At the same time, policymakers must address a host of legal, regulatory, and societal

issues to ensure a fair and sustainable future for digital property. The case studies and progress discussed earlier in the thread demonstrate the importance of adapting to these changes, and underscore that companies and policymakers who respond proactively will be best equipped to prevail in this evolving environment.

5 Conclusion

This research has explored the emergence and evolution of information technology as it reshapes traditional notions of property and ownership. This transformation is impacting consumers, businesses, and the broader socioeconomic landscape, requiring all stakeholders to revamp their strategies, behaviors, and policies.

Historically, models of ownership were fundamentally premised on tangible, physical control over goods. However, the digital age has unlocked new models that challenge and transform these fundamental concepts. The key attributes of property rights - exclusivity, transferability and permanence - have been significantly redefined or, in some cases, blurred or fragmented. Developments such as software licensing, digital subscriptions, cloud computing, DRM technologies, and blockchain-based systems illustrate the evolving and multifaceted nature of property in the digital age.

These transformations, in turn, have spurred controversy and resistance. In the digital realm, practices such as software licensing terms, DRM restrictions, hardware lockdowns, etc., can be considered as "dispossesion" or "enclosure" by companies that maintain control over digital goods and services after the sale. While arguably necessary to protect intellectual property and ensure business sustainability, these practices have raised critical concerns with regard to consumer rights, market competition, and social justice.

Looking to the future, the paper predicts that emerging technologies such as AI, IoT, and blockchain will continue to reshape the concept of ownership. This shift will likely lead to changes in consumer attitudes and behaviors, with an

increased reliance on digital technologies, a shift in perceived posession, and a growing focus on privacy. Businesses will need to adapt their strategies to these changes, particularly in relation to revenue models, customer relationship management, product development and competitive positioning.

The challenges for policymakers are equally significant. Existing laws and regulations will need to be reassessed and, in some cases, substantially updated to address issues of intellectual property rights, privacy, consumer protection, and societal impact in the era of digital ownership. Balancing the interests of all stakeholders in this rapidly changing environment will prove challenging, but vital.

In conclusion, the digital transformation of ownership models is not just a technological change; it is a profound socio-economic change. This research underscores that the concept of ownership is an evolving paradigm that will continue to adapt in the face of technological advances. The collective challenge for researchers, business leaders, and policymakers is to keep pace with these changes, to anticipate the opportunities and challenges they present, and to steer the direction of this evolution toward an equitable, sustainable, and prosperous future.

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