Global Business and Management Research: An International Journal
Vol. 16, No. 4s (2024)

# Exploring the commercial adoption behavior of software licensing & monetization (SLM) tool: A conceptual framework ideation

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**Abstract**

**Purpose:** The surge in leveraging software for profit has propelled the adoption of "Software Monetization" (SM) as a strategic business approach. The Software Licensing and Monetization (SLM) tool is essential for vendors to achieve their strategic objectives. However, challenges persist in the rapid adoption of this tool within their organizations. As a result, vendors find themselves at a competitive disadvantage, limiting their ability to maximize profits and increasing production costs for their final products. This paper introduces a conceptual framework to address the vital need for a comprehensive industrial model in the SM sector.

**Design/methodology/approach:** Using a qualitative approach, this study uses a meta-analytical method to inductively examine the literature on Software Monetization (SM), Software Licensing and Monetization (SLM) tools, and technology monetization and adoption. Expert interviews were employed to triangulate the literature review, informing the development of a conceptual framework.

**Findings:** The research unveils a notable absence of Software License Management (SLM) solutions among many market vendors, possibly due to a limited understanding of software monetization and available tools. Despite the growing significance of Software Monetization, vendors lack a cohesive process in their organizations. Various factors, including cultural, economic, and pricing influences, impact adoption. Remarkably, there's a dearth of studies employing a technology adoption model as industry guidance.

**Research limitations/implications:** Filling a void, this paper utilized the Technology Acceptance Model (TAM) as the foundational theory, expanding insights with novel constructs—market forces, processes, and internal variables—pertinent to Software Monetization (SM) adoption behavior. Emphasizing global relevance, the paper introduces cultural factors to comprehend their impact on Software Licensing and Monetization (SLM) adoption behavior.

**Practical implications:** The proposed conceptual framework promises substantial managerial advantages for stakeholders in software monetization. It aids software vendors in the

streamlined adoption of Software Licensing and Monetization (SLM) tools, offering insights into barriers and cost/resource comparisons. End users gain clarity on SLM-protected system processes and automation possibilities. Primary SLM tool providers can optimize market strategies, overcome obstacles in marketing plan development and tailor region-specific approaches for successful market entry.
**Originality/value:** The focus centered on "Software Monetization" and related tools, specifically "Software Licensing and Monetization." This paper marks the inaugural investigation into organizational adoption patterns of this technology. The uncovered insights and outlined conceptual framework stand as a valuable reference for suggesting future studies in this domain.

**Keywords**: Software Monetization, Software licensing, Monetization tool, Technology Adoption

## Introduction

Software Monetization (SM) emerged as a strategy around 2010, combining licensing entitlement management and software code protection through techniques like obfuscation and encryption (Thales Sentinel, 2023a). It has since evolved to include automation and user usage behavior analysis. SM is now integral to various industries, with even companies like General Electric transitioning into software-centric businesses (Rose, 2015). Sales of Software Licensing and Monetization (SLM) tools are rapidly increasing globally, with double-digit growth expected until 2025 (Frost & Sullivan, 2019). The market size for hardware, software, and services related to software monetization was USD 364.6 million in 2018 and is projected to reach USD 718.5 million in 2025 due to technological advancements (Frost & Sullivan, 2019). Figure 1 illustrates the 2018-2025 growth trend based on Frost & Sullivan (2019) data.

## Adoption challenges in the software monetization industry

Despite the rapid growth of Software Monetization (SM), challenges persist in its adoption by organizations across the globe. In 2021, a Revenera survey showed a 28% increase in SLM tool usage compared to the previous year, with 62% adopting subscription pricing models (Revenera, 2021). In the year 2022, Thales Sentinel, a prominent worldwide collaborator specializing in software licensing, delivery, and protection, disclosed some noteworthy findings. According to their report, a staggering 90% of participants expressed the view that revenue was adversely affected by customer license violations. Additionally, 91% reported grappling with rigid pricing models, resulting in the loss of business opportunities. Moreover, 89% identified piracy and concerns related to intellectual property as significant issues arising from competitive dynamics (Thales Sentinel, 2022).
Furthermore, Thales Sentinel's Gatepoint Research revealed that only 35% of software vendors were satisfied with how they sold software products, and 59% expressed interest in SLM solutions (Thales Sentinel, 2021). Despite industry growth, the adoption of commercial SLM remains an issue for many vendor-based organizations. Revenera's 2021 report found that only 23% adopted complete SLM solutions, while 34% relied on homegrown approaches, 19% used basic licenses paired with ERP or CRM, and 23% had not adopted any technology (Revenera, 2021).
Thales Sentinel's 2022 report indicated that nearly 50% of vendors were still pending in implementing SLM (Thales Sentinel, 2022). Its regional distributor, Matrix Invent MSC Sdn Bhd (MI-MSC), have also observed a consistent trend in the industry, where their sales cycles may range from a minimum of 3 months, to a maximum of 12 months, varying across different

countries (Lai, 2020). Hence, the revenue reported to range as low as USD 5,000 in Thailand to as high as USD 150,000 in Australia and New Zealand (Lai, 2020).

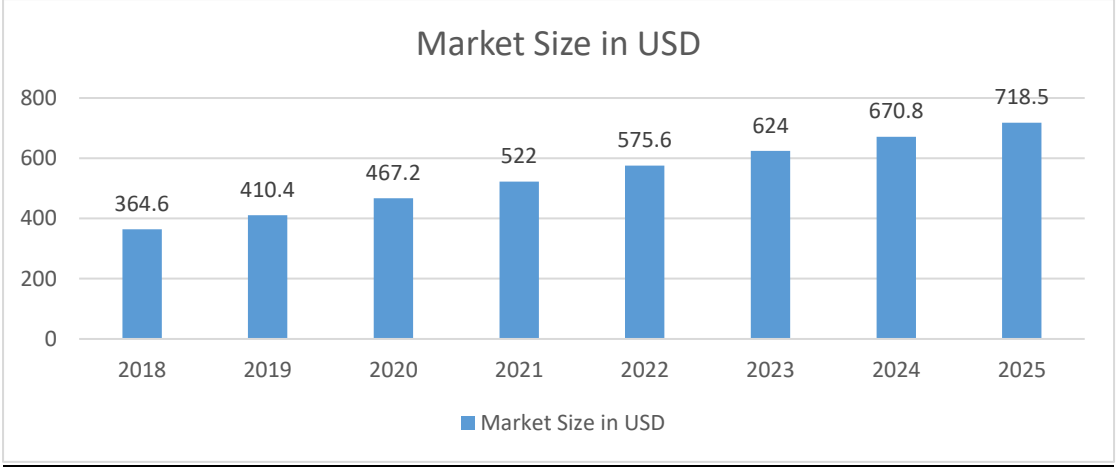


Figure 1 Software Monetization Growth Trend (2018-2025)
Source: Authors

Commercial research companies like Frost and Sullivan (2019) have identified barriers to software monetization practice in the industry, such as high upfront costs, reliance on in-house solutions, and a lack of confidence in commercial SLM. Unfortunately, there is limited research on a holistic understanding in enhancing software monetization adoption despite its financial gain potential (Ghosh et al., 2019). Hence, the question remains: Are there any factors hindering adoption due to awareness of SM concepts and the availability of SLM tools in the market?

This formed our first **Research Question 1** (RQ1) – *To what extent is the awareness of Software Monetization and the accessibility of Software Licensing and Monetization (SLM) tools contributing to the slow adoption within software vendor-based organizations?*

Hence, **Research Objective 1** (RO1) - *To evaluate the influence of awareness regarding Software Monetization and the availability of Software Licensing and Monetization (SLM) tools on the incremental adoption within software vendor-based organizations.*

Studies on the adoption behaviour of organizations in information systems have been a mature topic for decades (King & He, 2006). Researchers have been studying technology adoption behaviour in the areas of Industrial 4.0 (e.g., Raj et al., 2019), artificial intelligence (e.g., Alsheiabni et al., 2019); healthcare (e.g., Tortorella et al. 2020); customer relationship management (e.g., Ngoni and Santoso, 2017); Internet of Things (IoT) (e.g., Singh. et al., 2017); agriculture (e.g., Li et al., 2020), and consumer's wearable technology (e.g., Kalantari, M., 2017). Despite the potential lack of awareness regarding Software Monetization (SM) and the availability of Software Licensing and Monetization (SLM) tools, and notwithstanding the expected advantages for software vendors in adopting SLM tools, the adoption rate is perceived as low and has not been thoroughly examined.

This research gap motivated our second **Research Question 2** (RQ2) - *What are the reasons for the current low adoption rate of the SLM tool in software vendor organizations?*

Hence, **Research Objective 2** (RO2) - *To examine the reasons that may explain the low uptake of the SLM tool in software vendor organizations.*

Many technology adoption frameworks have been created and extended in recent decades. For instance, the Technology Adoption Model (TAM) designed by Davis (1986) is popular due to its simplicity and has been extended by many other researchers (King & He, 2006). Lai (2017a) suggested TAM as the appropriate model to use for the initial study in a new industry. Hence, this paper has decided to use a technology adoption framework to study the adoption behaviour of organizations for SLM tools due to the novelty of the study.
This formed our **Research Question 3** (RQ3) of this study - *How can we better use the Technology Adoption Model (TAM) to enhance software vendors' adoption rate on the SLM tool?*
Hence, **Research Objective 3** (RO3) - *To propose strategies for enhancing software vendors' adoption rate of SLM tools with the Technology Adoption Model (TAM).*

As an outcome of addressing the three research objectives, this paper introduces a conceptual framework designed to address the crucial necessity for a comprehensive industrial model within the software monetization sector. The framework aims to bridge a gap in the Technology Acceptance Model (TAM) when applied to the examination of software monetization adoption behavior. Simultaneously, it assists software vendors in the efficient integration of Software Licensing and Monetization (SLM) tools, providing insights into barriers and facilitating cost/resource comparisons.
End users, in turn, gain a clearer understanding of SLM-protected system processes and potential automation capabilities. For primary SLM tool providers, this framework becomes a valuable resource for optimizing market strategies, navigating challenges in marketing plan development, and customizing region-specific approaches for successful market entry. Hence, this paper signifies the inaugural exploration into the organizational adoption patterns of software monetization technology.

## Literature Review

### *Software monetization (SM)*

Thales Sentinel associates "Software Monetization" with a process empowering the company to generate additional revenue through flexible business models, seizing new opportunities, minimizing leaks, optimizing supply chain efficiency, and enhancing customer satisfaction (Thales Sentinel, 2023a). According to Revenera (2023), it is defined as the continuous process used by software suppliers to extract maximum value from their products and services while safeguarding applications and intellectual property.
Wibu, a significant market player, defines Software Monetization as the ability to maximize software revenue effectively by meeting market demands (Wibu, 2023). According to an internal survey conducted by Thales Sentinel's business value team, based on a sample of 50 customers since 2018, 75% of their customers intend to use Thales Sentinel's products with the primary objective of revenue generation. Additionally, 15% aim to enhance operational efficiency and 10% seek to increase customer satisfaction (Thales Sentinel, 2021).

Examining the three dominant market leaders, holding a combined market share of over 95% (Frost & Sullivan, 2019), reveals that the pivotal aspect of Software Monetization involves continuously generating higher revenue with the flexibility to offer diverse business models for various market segments. Agility, in this context, pertains to the pricing or packaging of specific products or services.
As explained by Ferrante (2006), pricing models since 2006 include server-based licenses (priced based on server capacity), network-based licenses (priced based on distributed users

connecting to a centralized server), subscription-based pricing, and utility-based pricing (where customers are charged on a pay-per-use basis). In the contemporary landscape, software and services are now "Licensed to use," departing from the conventional practice of buying or selling a product. Customers don't own the product but are granted the right to use the software and services for an agreed-upon fee (Ghosh, 2019).

***Historical development of licensing sales models***

Decades ago, trade between the software vendor and customer was already licensed to use instead of sold. The key goal is to protect the trade secret of the intellectual property of the software vendor (Harper, Jr. 1985). Law and legal procedures also evolved to put in place if software vendors face bankruptcy, and the right should be claimable to use by the customer as protection (Wernick, 1992). Sales of software's business model have been long available started extensive with the perpetual model. This means selling a product at a fixed price with a fixed renewable fee yearly as maintenance and support (Ferrance, 2006).

Hence, investment decisions on the exact amount of license needed have always become a focused subject of studies for researchers (Quandt, 1998). Followed by a network-based license also named a concurrent license when the rising development of the network in organizations becomes an additional option of architecture to allow agreed users to access the centralized application as a business model (Cacciari et al., 2012). This means a fee has been agreed to a fixed number of users that only the eligible number of users can concurrently access the centralized system in a distributed mode.

***What is driving the development of "Software Monetization" (SM)?***

The primary drivers for the growth of Software Monetization (SM) include heightened IT spending, the expansion of emerging technologies, concerns related to software piracy, and unauthorized usage. In 2021, enterprise software spending is expected to rise by 7.4% to $483 billion (Liu, 2020). Technology advancements, including intelligent sensors like IoT devices, are vital for SM in various functions (Jeea & Sohna, 2018). Software now runs on diverse devices and platforms, necessitating new licensing mechanisms to meet commercial needs. Emerging technologies are projected to achieve a 46% revenue growth between 2018 and 2023, driven by factors like IoT connectivity, SaaS + PaaS, robotics, AI platforms, and next-generation security (CompTIA, 2023; IDC, 2019).

In addition, software vendors face significant financial losses due to software piracy, with an average global revenue loss of 37% in 2018 (BSA Survey, 2018). This challenge presents an opportunity for vendors to enhance their software monetization strategies. While many start with in-house solutions, developing such tools is challenging due to limited resources and the evolving technical landscape (Ferrante, 2006). This need for a commercial software monetization tool is particularly crucial for non-IT-oriented vendors, whose primary revenue source relies on software as intellectual property. Frost and Sullivan forecasts a 12.3% annual growth rate in the software monetization market, reaching USD 718.50 million by 2025 (Frost & Sullivan, 2019). This niche opportunity has been steadily growing and is expected to continue.

***Alternative monetization strategies***

As the study of software monetization remains in its infant stage, we noted a few unique monetization strategies from different technological industries. Though it is not under the scope of software monetization, it can be an excellent comprehensive comparison to understand technological-related monetization.

Mobile app monetization – A consumer-based Business-to-Consumer model that attracted many studies recently on monetization strategy. It involved two models i) Selling Ads and ii) Selling Paid versions. Ads selling but free-to-use mobile apps usually will have a shorter retention rate to use the application, whereas paid version mobile apps tend to be suitable for long-term users (Appel et al., 2019).
Data monetization – Data especially collected from IOT can never be used for trading. Many companies today are progressing to transform themselves by managing data. The data can be collected from their supply chain, workspace, etc. Companies are learning to maximize the value of the data they own and strategically monetize it (Opher et al., 2016). At a personal level, even researchers have proposed monetizing personal data via wearables that can be fair for both business and consumer (Bataineha et al., 2016).
There is even unethical monetization via disinformation that was studied by the researcher. As (Ryan et al., 2019) suggested extensive internet coverage has caused malicious parties to publish disinformation content to attract visitors to the webpage and earn advertising revenue or cross-sell certain products to them. The financial impact of technology and software is immense. As this has been explained in the introductory chapter the first and key driving factor of the need for Software Monetization is that everything is going to be software related.
Jeff Immelt of (GE) once said "The notion that there is a huge difference between the *industrial world* and the *software world* is no longer valid…. those days are over. **In today's world, everything is software"** (Thales Sentinel, 2022). He also expressed that "Every Company has to be a Software Company in the future" in an interview with Rose (Rose, 2015). The main driving force indeed the natural evolvement of all industries blending with software. If everything is going to be software in the future. It is not an option but a necessity to force businesses to have the mindset to profit from their IP in software.

***Understanding Software License and Monetization (SLM) tool***

An SM tool, also known as a Software Licensing and Monetization (SLM) tool in the industry (Frost & Sullivan, 2019), serves the purpose of SM, as illustrated in Figure 2. According to Thales Sentinel (2023a), the SLM licenses and protects software code, offering diverse licensing models to cater to various business requirements and safeguarding intellectual property through encryption and obfuscation. Additionally, the tool provides localization capabilities to tailor and integrate with different industrial environments, enhancing operational efficiency through automation.

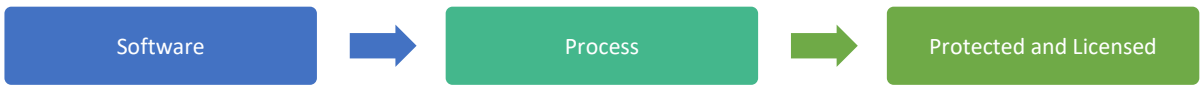


Figure 2 Software Monetization Process and Outcome Source: Authors

***Licensing and pricing models guide***

*"By 2021, over 50% of software revenue will come from the subscription/consumption business model, which includes on-premises software sold as a subscription and hardware/software as a service"* (Thomason, 2019).

In the era of burgeoning software-oriented business models, software vendors are driven to optimize revenue derived from their intellectual property. As forecasted by IDC in 2019 (Thomason, 2019), the subscription or consumption model is anticipated to contribute to over 50% of software revenue by 2021, fostering enduring relationships between end customers and

software vendors. Data from Aria Systems Research underscores this trajectory, revealing that merely 9% of U.S.-based companies hinge on one-time software sales, while a substantial 91% are transitioning towards recurring revenue models (Thales Sentinel, 2020a). One crucial use of the SLM tool is to provide an agile platform for software vendors to package various licensing models for their products. Table 1 illustrates the common licensing models as suggested by Ferrante (2006).

Table 1 Common Licensing Models

| License / Model | Description |
|---|---|
| Package | A single license purchased for a single user or machine, ready for immediate use without additional customization or configurations. |
| Perpetual | The sale of the license to use is one-time, with yearly maintenance fees. |
| Feature | Sales of a license are based on features or modules. |
| Processor | Based on the number of processors or cores determines the price. |
| Network | License based on an agreed number of users can be used concurrently. |
| Subscription | License purchased based on a time basis between months or years. |
| Utility/Pay per use | Usage is based on the transaction and usage within a time. |
| KPI | According to an agreement on the key performance index and billing. |

***Homegrown commercial SLM tool***

Software vendors initially opt for in-house, "homegrown" SLM tools, believing they are cost-effective and faster to develop (Thales Sentinel, 2016). However, the dynamic business environment necessitates constant changes in licensing and protection systems, making in-house solutions outdated and leading to downstream impacts when pricing models change. This drives the need for "commercial" SLM tools (Thales Sentinel, 2016). When software vendors outgrow their in-house solutions, it leads to technical issues, slower time to market, and inefficiency due to multiple incompatible homegrown SLM tools, impacting customer satisfaction (Thales Sentinel, 2019).

Commercial SLM tools are designed to address these challenges, allowing software vendors to focus on software IP development. They offer faster marketing, agility in pricing models, and flexibility in packaging and pricing without software redevelopment. Commercial SLM tools are built to keep up with the fast-paced, ever-changing software landscape, automating processes, reducing delivery costs, improving efficiency, and expanding revenue streams (Thales Sentinel, 2023a; Revenera; Wibu, 2023).

***Intellectual property protection benefit***

Another critical objective of Software Monetization is safeguarding Intellectual Property (IP), including programming codes, algorithms, and designs, to combat the persistent problem of software piracy, which negatively affects business revenue (Frost & Sullivan, 2019). Given the ubiquity of software in nearly all technologically oriented solutions, protecting IP is crucial for businesses. Various programming languages, such as Java, JavaScript, PHP, Python, and VB.NET, are commonly employed in software development. Programmers often aim to reduce development costs and accelerate time-to-market. Among these languages, JavaScript is a widely used open-source scripting language for building commercial products (Jscrambler, 2023).

Protection is necessary for software written in these languages before commercial use, as malicious hackers often target unprotected code through reverse engineering to understand the coding logic. As a countermeasure, obfuscation is a commonly employed technique, serving as a "code dressing" method. This approach ensures that even if hackers reverse-engineer the code, they are unable to grasp its underlying logic (Thales Sentinel, 2023a; Guardsquare, 2023).

***The key functional elements of SLM Tool***

SLM tools in the market have three critical elements in common, even though many additional functionalities vary from vendor to vendor.

*Protection*

Protecting software Intellectual Property (IP) primarily involves obfuscating the original programming code before it is provided to the customer. Reverse engineering is a standard method hacker use to gain access to code. There are even tools available to download from the internet to reverse compiled codes. Unprotected code can expose IP and algorithms. Obfuscation, often referred to as “Code Dressing,” is essential to make the code unintelligible to hackers who may attempt to reverse engineer it (Thales Sentinel, 2023b).

*Entitlement*

The “Entitlement” feature of an SLM tool is vital, enabling customers to access their software, device, or embedded software licenses. It also empowers software vendors to create diverse pricing and packaging strategies. These licenses can align with various models such as perpetual, feature-based, time subscriptions, or pay-per-use, and they can be utilized across different platforms and Operating Systems. The automated system supports manual and automated license issuance and renewal through an Application Programming Interface (API). An integrated database manages customer and channel partner licensing information for software vendors selling directly or through resellers (One of many). This centralized database monitors all issued licenses (Thales Sentinel, 2023b).

*Business Insights*

The significance of the third element, emphasizing the analysis of customer usage behavior, has escalated. This empowers software vendors to collect and scrutinize customer usage data, enhancing their offerings. Projections indicate that by 2022, 50% of software vendors will leverage anonymized data through their software monetization tools to refine their understanding of customer needs and software performance (Thomason, 2019; Thales, 2020a).

***Market awareness of the concept of software monetization and SLM tool***

Sales lead generation is crucial for SLM tool manufacturers, with leads sourced from various channels, including digital methods (Monat, 2011; Ooi, 2015; Ramahkhrisnan et al., 2006). The quality of leads significantly impacts the conversion rate and overall organizational performance, emphasizing the importance of market awareness and informed decision-making (Bonney et al., 2016).

Frost & Sullivan (2019) highlighted persistent adoption barriers, including high upfront costs, reliance on in-house solutions, and a lack of confidence in commercial SLM tools. To address these challenges, assessing lead awareness of software monetization (SM) and software licensing and monetization (SLM) tools is essential. This awareness introduces the concept of “Market Driver,” which measures the market's influence on sales performance and identifies factors that can enhance adoption rates.

***Gaps in understanding the current state of the software monetization process***

Business Process Management is crucial for coordinating functional activities effectively, improving service delivery, reducing costs, boosting revenue, and enhancing customer service (Constantinides et al., 2013; Agarwal et al., 2009). In large organizations with multiple teams, effective organizational management processes are essential.

While software monetization has a significant financial impact across industries, there is limited research on this process. Ghosh et al. (2019) conducted one of the closest studies, focusing on the software renewal process and its challenges. However, this research only covers a subset of the software monetization process, omitting various pricing packaging models and the crucial element of intellectual property protection (programming codes).

Wang et al. (2019), a Thales Sentinel LDK product user, shared their understanding of the software monetization process and its alignment with their SLM tool. They introduced several roles associated with the tool, including a product manager, development engineer, customer service staff, and entitlement manager as shown in Figure 3 below.

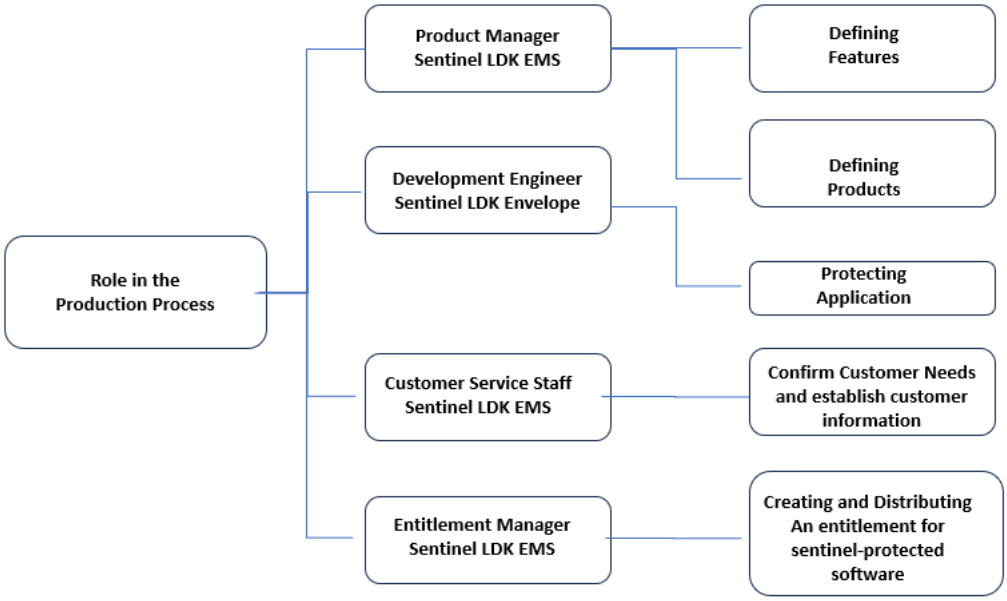


Figure 3 Roles of Production Process
Source: Authors

There is currently no standardized software monetization (SM) process in the market. Ghosh et al. (2019) and Ferrate (2006) predict that automation will play a significant role in the future of SM. This raises the question of whether understanding the customer's SM process can enhance the adoption rate of Software Licensing and Monetization (SLM) tools. Poor adoption rates may result from unclear customer understanding of the SM process, making it challenging for SLM vendors to propose suitable solutions (Dimillo & Thomason, 2020). Effective integration of organizational processes, technical aspects, and systems knowledge is crucial for IT adoption rates (Samolienko, 2008). Matching technology with task requirements is essential, as a good task-technology fit increases usage, while a poor fit reduces it (Goodhue & Thompson, 1995; Lin & Huang, 2008). Therefore, the "SM process" is a significant variable.

Although there is some research on the software subscription renewal process, it covers only a portion of the SM process (Ghosh et al., 2019). Currently, there is limited to no study on the state of automation in the SM process despite its significant role in revenue generation from

software sales (Frost & Sullivan, 2019). Understanding the automation level in the SM process can help establish foundational knowledge in this industry. Hence, the State of Automation becomes another critical variable, forming a new construct together Software Monetization Process.

***A long debating subject - Technology Acceptance***

There are many suspected factors that may cause the different adoption behaviour including culture, economy, awareness, technological development, and the list can count on. However, there is a lack of study in this area which is vital for the investigation of "Technology Acceptance." Ajzen (1991) believes human behaviour is challenging to predict. Corrales and Westhort (2006) suggested that a country's higher level of trade; income; literacy; technology infrastructure; and market-oriented policy will increase technology adoption. Competitive pressures that are signaled by the organization among peers (Krizaj et al., 2014) and even pressures from end customers can strongly impact IT adoption in an organization (Lin, 2017). Even a country's national culture can profoundly influence IT adoption (Steers, 2008).

***Chronological events of Technology Adoption Models***

Technology adoption models, a well-established domain in contemporary Information System literature, have extensively elucidated user acceptance behaviors (Venkatesh et al., 2003). Originating from the Theory of Reasoned Action (TRA) by Fishbein and Azjen in 1975, initially for sociological and psychological research, the majority of IT-focused adoption frameworks trace their roots to TRA. In response to TRA's limitations, Azjen (1991) developed the Theory of Planned Behavior (TPB). It wasn't until 1986, when Davis introduced the Technology Acceptance Model (TAM) for Information systems in his doctoral studies, and later refined TAM in 1989 (Lai, 2017a).

The Technology Acceptance Model (TAM) has undergone extensions with TAM2 (Venkatesh & Davis, 2000) and TAM3 (Venkatesh & Bala, 2008), representing an evolved trajectory. Rogers (1995) contributed the widely used Diffusion of Innovations (DOI) model, specifically designed for measuring innovations. Recognizing the need for integration, Venkatesh et al. (2003) proposed the Unified Theory of Acceptance and Use of Technology (UTAUT), encompassing the Model of PC Utilization (MPCU) and Social Cognitive Theory (SCT). While various models exist, this paper focuses exclusively on those stemming from TAM and its original concepts.

***Understanding the root of Technology Adoption models - Theory of Reasoned Action (TRA)***

The Theory of Reasoned Action (TRA) stands as a fundamental and influential theory for predicting human behavior (Venkatesh et al., 2003). Serving as a precursor to many subsequent models, TRA, developed by Dr. Martin Fishbein in 1967 and refined by Fishbein and Azjen in 1975 (Barry, 2016), remains foundational. Comprising main constructs of Attitude and Subjective Norms, TRA forms an intention towards behavior (Fishbein & Azjen, 1975). Attitude, within this context, denotes an individual's belief, whether positive or negative, towards a particular intention.

Attitude comprises behavioral belief and outcome evaluation. In contrast, Subjective norms comprise normative beliefs and motivation to comply. Explaining from the angle of an IT scenario using Figure 4, behavioral belief is a targeted user's personal belief whether positive or negative towards the use of the system. The user may have an outcome evaluation that the successful adoption will add value to one skill set that may be useful in the future. As to normative belief, the user may believe everyone in the company has to pick up the skill to use

the system as an essential operational skill. The motivation will be a potential promotion if the user can master the skill to use the system.

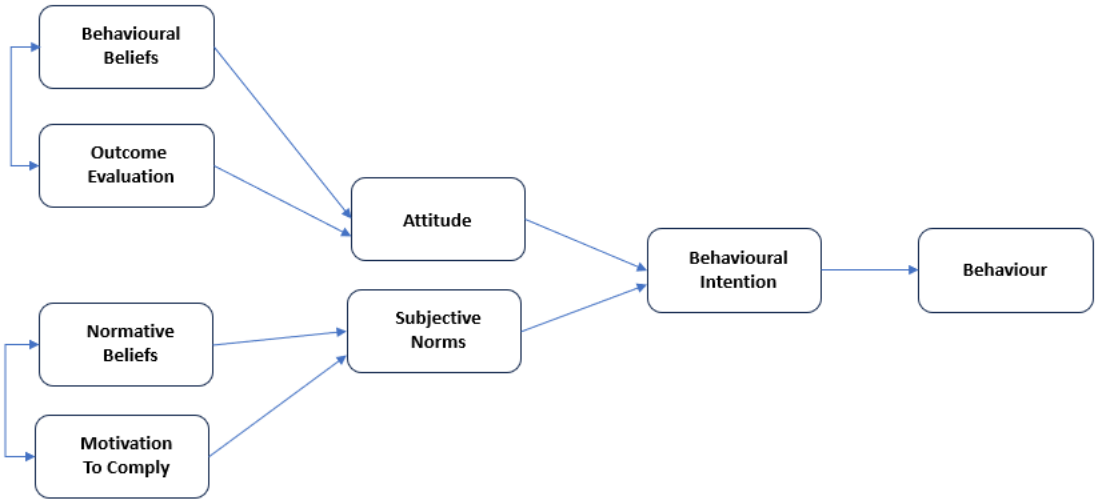


Figure 4 Theory of Reasoned Action Model
Source: Authors

***Technology Acceptance Model (TAM)***

The Technology Acceptance Model (TAM) emerged in the late '80s with the advent of new technologies such as word processing and emails (QUT, 2015). Despite the proliferation of innovations, user adoption remained hindered by performance concerns (Bowen, 1986; Young, 1984). Enterprises, relying on unvalidated user perceptions, faced challenges in product development (Bewley et al., 1983; Good, et al., 1986; Gould, et al., 1983). In response, Davis (1989) devised TAM as an extension of TRA tailored to predict user behavior in the information system context. Based on (Davis (1989) explanation, Figure 5 illustrates that TAM pivots on user perceptions shaping attitudes, influencing the intention to use a specific technology.

Davis identified two pivotal factors influencing user attitude:

i) Perceived Usefulness (PU), defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320), and
ii) Perceived Ease of Use (PEOU), defined as "the degree to which a person believes that using a particular system will be free of effort" (Davis, 1989, p. 320).

Both directly shape user attitudes and intentions to adopt a system, with PEOU also influencing PU to a certain extent. External factors, such as training, user participation, and system characteristics, are occasionally considered in the model (Lin et al., 2011). TAM is favored for its simplicity and clarity (King, 2006), but critics argue its individual-centric nature (Jaime & Eoin, 2020; Jacob et al., 2020). Suggestions to augment TAM with additional variables for an improved framework have also been proposed (Legris, Ingham, and Collerette, 2003).

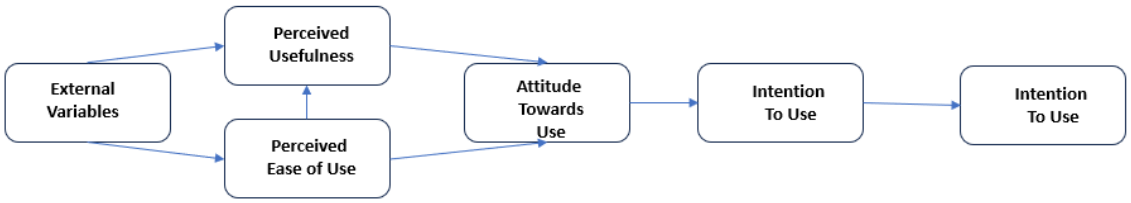


Figure 5 Technology Adoption Model
Source: Authors

***The reason TAM was selected for the extension***

Davis (1989)'s TAM forms the base of our conceptual framework. The reason for the selection is due to the simplicity of TAM, which is technologically oriented and customizable, hence relevant to software monetization study. Researchers also widely endorsed TAM in predicting user acceptance (Chhonker et al., 2017). King and He (2006) also provided a comprehensive meta-analysis of 88 studies with 12,000 observations demonstrating that TAM is potent and robust for prediction. A recent study by Jacob et al. (2020) showed that TAM continually dominates, with 34% using TAM for extensions in the M-Health segment.

The three main reasons for choosing TAM are:

i) PU and PEOU are robust and precise;
ii) Extensions are necessary to increase forecasts for various industries, and regions; and lastly,
iii) Novelty of the study in the commercial software monetization tool.

***Critiques of TAM***

TAM is widely adopted because it is easily understood and deployed (King & He, 2006). However, it is argued by many researchers believe that TAM is a very individual-centric framework (Jaime & Eoin, 2020; Jacob et al., 2020). Many researchers also suggested adding more variables to make TAM a better framework. (Legris et al., 2003). It should be extended with custom variables to improve the prediction accuracy (Taherdoost et al., 2009) in different use cases. Lai (2017a) suggested using the TAM when the topic being investigated is new. But it is incomplete without adding and integrating new constructs to increase the study's accuracy.

***Propose variables for standard constructs of TAM and customized constructs***

*Proposed Variables for Perceived Usefulness (PU)*

PU can be related to Return on Investment (ROI) when adopting software licensing and monetization (SLM) tools (Davis, 1989). Be it in the form of tangible or intangible. There are three variables suggested by experts over 30 years as an industrial pioneer. There are "*Agility"*, "*Operational Efficiency,"* and "*Intellectual Property* (*IP) Protection"* (Lai, 2017b; Thales Sentinel 2016, 2019, 2020a, 2020b, 2023a, 2023b).

> *Agility* - refers to SLM's ability to provide different business models to monetize software vendors' products. The SLM tool will enable flexible packing and repackaging of a product in terms of price model without the need to change the coding of the software. E.g., Feature-based, Subscription-based, Usage-Based, and User-Based.

*Operating Efficiency* - refers to how the SLM tool will be able to present as a platform to improve the integration and automation of the software vendor's (SM) software monetization process. To improve the existing SM process to save costs and be more efficient, which in turn enhances client satisfaction.

*Intellectual Property (IP) Protection* - refers to the ability of the SLM tool to protect the IP of Software via different obfuscation and encryption techniques to avoid being reverse-engineered by a malicious party. The security protection process is costly, specialized, and lengthy. This is a crucial function of an SLM tool for software vendors as a priority to protect their IP. The commercial value can be easily stolen if there is no proper protection on it.

*Proposed Variables for Perceived Ease of Use (PEoU)*

The PEoU can influence the perceived usefulness (PU) and attitude towards usage within the TAM. The degree of user-friendliness of a system is important for adopting any new technology (Davis, 1989). There are also two important perspectives in terms of "Easy to Use." One will be the software vendor that intends to adopt and implement an SLM tool for their organization. The willingness of software vendors to adopt the SLM tool will be influenced by the efforts required to implement the system and ease their workload in their daily operations.

Another aspect is the end customers of the software vendor. In this use case, PEoU will be relating to the 'ease of use' of the end-customers in terms of license activation, renewal, and upgrading the license (Lai, 2017b; Thales Sentinel 2016, 2019, 2020a, 2020b, 2023a, 2023b). These two angles created two variables under this group to measure PEoU and predict the influence of adoption behavior.

*Ease of Use for Customer (Vendor)* – A variable designed to investigate the impact of the ease of integrating Software License Management (SLM) as a novel technology within the organizational structure of a software vendor.

*Ease of Use for End User* – A variable intended for examining the impact of ease in license activation, renewal, and upgrades, specifically from the perspective of a vendor.

*Proposed external variables particularly highlight culture*

External variables are needed to increase the accuracy of predictions by TAM (Lai, 2017a). Three external variables will be added to the findings of the literature review. The first variable is "economy" because of the pandemic once in a century, which caused the world economy to turn upside down. Therefore, including the economy as a variable is inevitable and crucial for this study. A second external variable proposed is "government" as a developing country that will tend to rely on government direction and incentives (Stapleton, 2010). The third variable is "Culture," one of the core variables continuously being studied about its impact on technology adoption by Hofstede (2001).

*Covid-19 pandemic impact on "Economy"* - The global pandemic of 2020 has claimed millions and hundreds of thousands of lives worldwide. The World Health Organization (WHO) has said that one in ten people worldwide may have been infected with the virus in October 2020 (BBC, 2020). Governments around the world are taking different approaches to this pandemic. A critical approach is via containment, which can work but can hurt the economy. It is hard to balance the containment of the virus

with the reduction of its impact on the economy. In a time of lockdowns, many economic sectors will remain stagnant.

*Role of "Government" in technology adoption* - "Government" is critical to technology adoption, especially in developing countries (Stapleton, 2010). The role of the government in technology adoption continues to be significant (Doh & Kim, 2014). Government actions, especially in reducing financial and technology risks like tax rebates and providing subsidies to adopt new technology are critical to many successful adoptions. The government offers financial support in Malaysia to encourage technology adoption (Alam & Noor, 2009). Hence, it will be interesting to study whether "Government" is also a factor influencing the influence of software vendors to adopt the SLM tool.

*Cultural differences and their implications for technology adoption* - Hofstede (2001) explained that "Culture" is a collection of collective mental programs distinguishing people. It can also be as simple as describing people's different interpretations of events around them (Geertz, 1973). Embracing new technologies in an organization means change. Resisting change is still challenging for organizations (Erwin & Garman, 2010). Organizational characteristics play a significant role in organizational innovations (Rogers, 2003). Hofstede (2001) and Bruland (1995) argue that its conclusions on the cultural framework have had an impact on the acceptance of technology in a national social setting.

Hofstede and Hofstede (2005) reported four significant dimensions of national cultural differences. Firstly, ***Power Distance (PD)*** – A high power distance score is characteristic of power being centralized among certain people in an organization, and vice versa; low power distance is more balanced in power distribution and less hierarchy in an organizational structure (Hofstede et al., 2010). Ozbilen (2017) suggested that, according to Rogers' (2003) argument, a power-intensive organization would limit an organization's innovative development.

Second dimension measuring **Collectivism versus Individualism (IND)** - A high index of collectivism in the country tends to limit the communication channel, as information is vital for belonging to a particular group. Rogers (2003) suggested that a good communication culture within an organization will tend to spread good innovative ideas. Ozbilen (2017) pointed out that a collectivist society does not pay much attention to new ideas. For example, collectivism will tend to limit the development of new technologies, and individualism will grow to facilitate the development of new technologies (Harzing & Hofstede, 1996).

The third dimension is **Uncertainty Avoidance (UA)**, the degree to which culture members feel threatened by ambiguous or unfamiliar situations. High "uncertainty avoidance" indexed nation's organizations to create procedures to reduce uncertainty (Hofstede et al., 2010). Rogers (2003) also suggested that formalization prevents innovation from being considered within an organization. Therefore, a high uncertainty avoidance culture will tend to slow down technology adoption (Kirsch et al., 2012).

Out study focuses on three significant dimensions consistent in the study but will exclude femininity compared to masculinity' as many researchers found no link between this index and the adoption of technology (Ozbilen, 2017; Erumban and de Jong, 2006 and Gales, 2008). Cultural differences must be included as an external construct to help study the SLM tool adoption rate. Based on Hofstede et al. (2010)'s data, Table 2 below shows the example of cultural index for countries covered by MI-MSC, the regional distributor of SLM tool developed by Thales Sentinel.

Table 2 Example of Cultural Difference Index by the markets served by MI-MSC

| | PD | IND | UA |
|---|---|---|---|
| Malaysia | 104 | 26 | 36 |
| Singapore | 74 | 20 | 8 |
| Indonesia | 78 | 14 | 48 |
| Thailand | 64 | 20 | 64 |
| Australia | 38 | 90 | 51 |
| New Zealand | 22 | 79 | 49 |

Source: Authors

*Proposed extended construct "Internal" and its Variables that align with Software Monetization Strategy*

To further improve TAM, investigate the specific industry of Software Monetization (SM). A new construct called "Internal" has been proposed. This, referred to as an internal business strategy can be endorsed and tuned by software vendors. According to research by Thales Sentinel, 75% of software vendors use the SLM tool intending to increase revenue (Lai, 2020). Next, to recover licensing leaks and insight into the usage data of the end-customers (Lai, 2020). It is imperative to understand the strategy of the software vendor and its influences on the adoption of the commercial SLM tool.

There are three variables to be proposed as below:

i. *Increase Revenue Opportunity* – The strategy to include various pricing models to tap into different market segments with the same software. Clear SM's strategy to use the SLM tool to increase revenue opportunity may influence the adoption rate of software vendors. (Eddie, 2020).
ii. *Software Compliance* – Unauthorized use of software may occur unintentionally or vice versa. The industry software overuse unintentionally due to a lack of enforcement tools is 25%-30% (BSA, 2018). Thus, a clear licensing strategy may help to recover leakage revenue.
iii. *Insights* – A strategy to capture and analyze end-client usage behaviour on software vendor functionality can help improve the product. Software vendors can also re-examine their monetization strategy on popular features and increase the price for maximum return. IDC has predicted that by 2022, 50% of software vendors will reach this goal to create differentiation and increase value for their clients (Thompson, 2019).

**Methods**

Our study adopts qualitative methodology, conducting an extensive meta-review of primary literature on Software Monetization (SM), Software Licensing and Monetization (SLM) tools, and technology monetization and adoption. Diverse sources, such as articles, commercial documents, technical guides, reports, and online content, are scrutinized. Integration of data from seasoned companies in software monetization enriches the study.

Rigorous validation is established through collaboration with a panel of industry experts, employing triangulation to assess findings and discussions. This meticulous process, undertaken over nine months, is directed towards formulating a conceptual framework to contribute to the understanding of software monetization dynamics. The multifaceted approach

ensures a comprehensive exploration of the subject matter, incorporating both theoretical insights and practical industry perspectives.

**Findings**

A new conceptual framework, an extension of the Technology Adoption Model (TAM), has been developed based on the findings from the literature review. This extended framework introduces three additional constructs: Market Driver, Process, and Internal variables, and is designed to study the adoption behavior of Software License Management (SLM) tools in the Software Monetization (SM) industry.

The original key constructs of TAM in relation to the study are:

1. "External variables" represent the external factors or influences outside the core constructs of the Technology Adoption Model that may impact the process of technology adoption. These encompass contextual elements such as cultural, social, economic, government influences, or organizational factors, as well as external conditions and circumstances that could affect software vendors' attitudes, intentions, and actual usage of the technology under consideration. This operationalization recognizes the dynamic interplay between the technology and its broader environmental context.
2. "Perceived Usefulness" denotes software vendors' subjective evaluation and conviction regarding the practical benefits, effectiveness, and value derived from engaging with particular SLM tools. This operational definition encapsulates the perceived utility and relevance of the specified entity, influencing the vendors' attitudes and intentions by shaping their beliefs about its positive impact on their tasks or goals.
3. "Perceived Ease of Use" evaluates the software vendors' subjective assessment and belief regarding the simplicity, effortlessness, and user-friendly nature of interacting with specific SLM tools. This operationalization captures the perceived level of ease associated with the utilization process, influencing the vendors' attitudes and intentions towards engaging with the designated entity.
4. "Attitudes towards Use" refers to software vendors' expressed opinions, feelings, and perceptions regarding the practical application or utilization of particular SLM tools. This encompasses a spectrum of sentiments, from positive endorsement to negative resistance, and influences the likelihood and manner in which the vendors engage with and adopt the said entity.
5. "Intention to Use" refers to software vendors' consciously declared plan or resolve to employ specific SLM tools in the foreseeable future. This operationalization encompasses the cognitive aspect of adoption, reflecting the vendor's proactive decision-making process and predisposition towards integrating the designated entity into their actions or routines.
6. "Actual Use" signifies the factual, real-world implementation and application of a particular technology by the software vendors in their daily activities. This operational definition encapsulates the tangible utilization, interactions, and integration of the specified entity into practical scenarios, providing an empirical measure of its functional incorporation in the vendor's operation.

From the meta-analysis of literature and expert panel reviews, we proposed the extended framework, proposing three new constructs to influence the external variables, aligning with the specific needs of the Software Monetization industry.

7. "Internal variables" signify organizational strategies that may influence the adoption of software monetization (SM). These encompass cognitive aspects, personal beliefs, and characteristics such as innovation awareness, perceived ease of use, and perceived usefulness. This operational definition acknowledges the intrinsic psychological and cognitive dimensions that shape the software vendors' attitudes, intentions, and behaviors towards adopting a particular technology.
8. "Market Driver" focuses on influential factors or conditions within an economic market that propel or stimulate the awareness of the SM concept and the demand for a SLM tools. These operational drivers can include consumer needs, technological advancements, regulatory changes, or competitive dynamics, shaping market trends and motivating businesses to adapt and innovate. This definition highlights the external forces that steer market behavior and influence strategic decisions within the business landscape.
9. "Process" helps understand the sequential stages and steps involved in the software monetization process and the level of automation involved. It encompasses the dynamic progression of awareness, interest, evaluation, trial, and eventual adoption by users. This operational definition recognizes the evolving nature of technology adoption, emphasizing the systematic and temporal aspects of software vendors' decision-making and engagement throughout the adoption journey.

The proposed conceptual framework depicted in Figure 6 not only enhances comprehension of the elements influencing SLM adoption rates but also establishes a foundation for evaluating intervention strategies designed to enhance the adoption of software monetization among the software vendors.

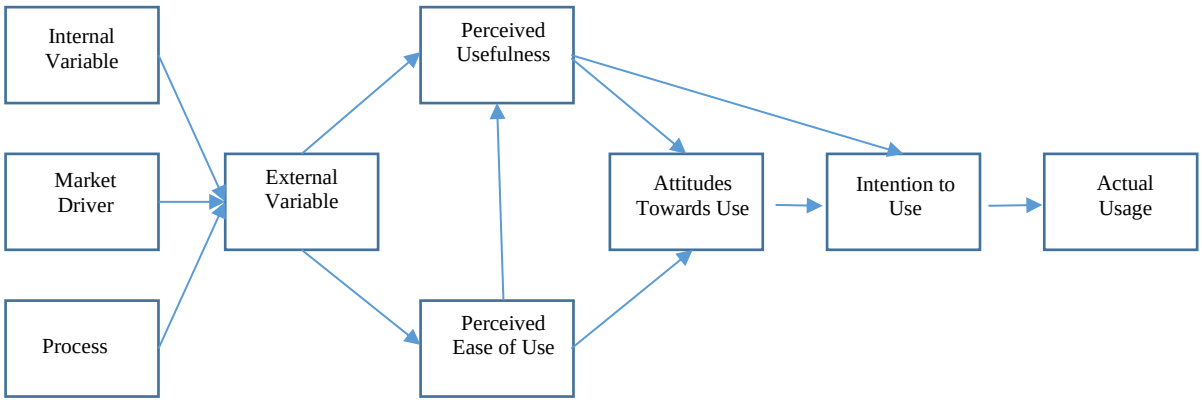


Figure 6 Proposed Conceptual Framework for Software Monetization Study

**Discussion and Conclusion**

The suggested extended conceptual framework is both distinctive and delves deeply into the quest for solutions aligned with the initially set objectives. This proposed framework can serve as a foundation for generating testable propositions, paving the way for the creation of fresh insights and knowledge.

For **Research Objective 1** (RO1) - *To evaluate the influence of awareness regarding Software Monetization and the availability of Software Licensing and Monetization (SLM) tools on the incremental adoption within software vendor-based organizations.*

A novel construct, "Market Driver," serves as the central focus for comprehending the obstacles that impede the dissemination of awareness regarding SM (Software Monetization) and SLM (Software Licensing and Monetization) tools within the market. Particularly, as these topics are relatively uncharted within this specific industry, it is essential to formulate fundamental but crucial inquiries, with a preference for qualitative research methods. To facilitate this investigation during its early stages, adopting a case study approach, combined with open-ended questions and content analysis, proves valuable. This approach aims to shed light on innovative tactics that can enhance the understanding of the concepts of SM and SLM within the market.

Furthermore, it is advisable to establish an online platform to gauge awareness, particularly by analyzing the keywords used to access the portal for more information. This strategic step will provide valuable insights into the market's perception and interest in these tools.

For **Research Objective 2** (RO2) - *To examine the reasons that may explain the low uptake of the SLM tool in software vendor organizations.*

To attain this objective, a comprehensive approach is proposed, involving the utilization of various constructs, each offering unique insights into the organization's strategy for adopting the SLM tool. The examination begins with an exploration of "Internal" variables, which shed light on the organization's strategic alignment with the SLM tool. This analysis extends to understanding the "Process" of software monetization within the organization, with the aim of identifying potential bottlenecks or areas for improvement within this process.

The investigation then shifts its focus to "Perceived Usefulness," emphasizing the benefits and advantages that the system's features can bring to users of the SLM tool. This perspective is instrumental in gauging user satisfaction and the practical value derived from the tool. Equally significant is the consideration of the "Ease of Use" construct from the framework. This aspect examines how the implementation of the SLM tool simplifies and enhances the vendors' experience, potentially reducing their workload and making their professional lives more efficient and manageable.

Lastly, the exploration delves into the "External" factors, which carry substantial weight in understanding reasons beyond an organization's control that may impact the adoption of the SLM tool. These external influences offer a broader context for comprehending the challenges and opportunities associated with SLM tool adoption.

For **Research Objective 3** (RO3) - *To propose strategies for enhancing software vendors' adoption rate of SLM tools with the Technology Adoption Model (TAM).*

The ultimate objective of the proposed conceptual framework is to establish a comprehensive model, encompassing a sequence of variables across end-to-end constructs, which can be utilized to formulate hypotheses. This framework aims to evaluate the relevance of all variables within the constructs, aligning with an extended model of the Technology Acceptance Model (TAM).

Following this analysis, the focus shifts to understanding user feedback in detail, offering a thorough exploration of the subject matter. The insights garnered from this process can be instrumental in assisting vendors in the more effective implementation of their SLM tools.

Moreover, this approach directly benefits SLM tool manufacturers, potentially leading to improvements in sales revenue and overall sales cycle efficiency. Ultimately, the framework seeks to enhance both the user experience and the success of SLM tools in the market.

Software monetization is becoming an important business strategy for companies as more revenue is generated from software intellectual property. However, the adoption of SLM tools that can be used for SM is slow and low. In contrast, there may be many factors behind this scenario; limited or non-existent studies have been conducted on the author's knowledge. Industry awareness of the concept of "Software Monetization" (SM) must be strengthened. Studies in this field are still in a pioneering phase. This created a gap in identifying which factors can be improved to improve SM awareness. It is also imperative to understand the factors behind the influence of the adoption behaviour of SLM tools.

Beyond the literature review stage of this article, there are a variety of technology adoption frameworks that can be used to assist in the study of this subject. However, there are no specific studies that use a technology adoption framework to understand the adoption behavior of SLM tools. This paper adopted the TAM to deepen understanding of all factors that may influence SLM adoption behaviour. A study related to this paper in this field is at the pioneer stage. TAM by Roger provides the flexibility to be extended via new constructs found during the literature review stage.

The fundamental concepts of “External Variable,” “Perceived Usefulness,” “Perceived Usability,” “Attitudes towards Use,” “Intention to Use,” and “Actual Use” may well be aligned with the variables to be used to study the problem. Constructs of “Internal”, “Market Driver”, and “Process” was introduced to extend the TAM framework, further illustrating the Software Monetization adoption better and more relevant. One of the important highlighted constructs was an exciting group of variables that can be used to study the cultural impacts. Due to the importance of the IP value of the software and the strategy to monetize it. This conceptual framework will assist all parties involved in the process of software monetization to protect the ultra-importance of software intellectual property value while also maximizing its potential values.

### *Theoretical Implications*

Software monetization is still in its early stages in terms of academic research, and this paper aims to shed light on the industry's development. With the industry's predicted continuous double-digit growth until 2025, understanding the adoption behavior, particularly within this sector, is essential. This paper makes a theoretical contribution by establishing a foundational framework tailored to this industry. This framework can serve as a basis for refining and enhancing future studies, not only within the software monetization field but also for other technology-related products. Standard and extended constructs developed in this study can be valuable references for similar industries.

### *Practical and Social Implications*

The new framework developed in this study offers valuable managerial contributions to various stakeholders in the software monetization ecosystem. For software vendors looking to adopt Software Licensing and Monetization (SLM) tools, this framework can streamline the adoption process, requiring less effort and a shorter learning curve. It provides insights into common barriers and factors influencing adoption rates, enabling vendors to make informed decisions. Additionally, it offers a cost and resource comparison between homegrown and commercial SLM tools, aiding in decision-making.

End users of SLM-protected systems can benefit from this framework by gaining a better understanding of the processes involved and the potential automation levels within their

organizations. The primary SLM tool providers can improve their go-to-market strategies by leveraging this framework. It helps them avoid unnecessary roadblocks during the development of marketing plans and enables the formulation of region-specific strategies for more effective market penetration.

***Limitations and Suggestions for Future Research***

This paper introduces a pioneering conceptual framework for the Software Licensing and Monetization (SLM) industry, marking a significant step towards understanding the intricacies of this field. While the framework provides valuable insights, it is crucial to acknowledge that its accuracy remains untested. The dynamic nature of the software industry suggests that continuous refinement and expansion of the framework may be necessary.

One avenue for future exploration involves adapting the framework to serve as a foundation for a more generalized enterprise system adoption study. This expansion aims to extract broader principles that can be applied beyond the realm of SLM, contributing to a comprehensive understanding of enterprise systems across various industries.

Given the innovative nature of this study within the industry, a recommended next step is to employ a qualitative case study approach. This method allows for an in-depth exploration of real-world scenarios, offering a rich context for evaluating the framework's practical applicability. Through qualitative analysis, researchers can identify potential gaps, limitations, and areas for improvement, informing necessary adjustments to the conceptual framework.

Following the qualitative phase, a quantitative approach can be employed to test the framework on a larger scale. This step aims to validate the findings more rigorously, providing statistical evidence of the framework's effectiveness and generalizability. This two-pronged strategy, starting with qualitative exploration and progressing to quantitative validation, ensures a thorough and robust assessment of the proposed conceptual framework.

In conclusion, this paper lays the groundwork for understanding Software Licensing and Monetization, presenting a conceptual framework ripe for further development and validation. The suggested qualitative and quantitative approaches in future research will not only enhance the framework’s reliability but also contribute valuable insights to the broader landscape of enterprise system adoption.

**Acknowledgment**

I express profound appreciation for the significant contributions made by the second and third authors, who also serve as my supervisors in my doctoral-level Action Research. Their professionalism and expertise in higher education played a pivotal role in guiding me throughout the entire research process. Additionally, I extend my thanks to the stakeholders from Matrix Invent MSC Sdn Bhd and the experts from Thales Sentinel for providing valuable professional insights and specialized comments over the years.

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