Decision Support for Digital Payment Facilitation

Sergi Gubin[1] [0009-0003-8244-1001], Petra Maria Asprion[1] [0000-0001-6582-5087], and Barry Franck [0009-0001-8557-1659]

[1] University of Applied Sciences and Arts Northwestern Switzerland FHNW, Switzerland
{sergi.gubin, petra.asprion}@fhnw.ch
[2] TechTrust, Switzerland
barry.franck@tech-trust.ch

Abstract. This research investigates digital payment facilitation in marketplace platforms (platform businesses) within the European Union (EU)'s regulatory framework, focusing on compliance and operational strategies when handling e-money. Platforms like Amazon, Uber and PayPal play a pivotal role in the digital economy but face challenges in managing payments under stringent regulations. The research addresses the decision-making gap for digital platforms considering in-house payment facilitation and selecting suitable financial licenses. An application-oriented artefact was designed and developed - a decision framework for marketplace platforms to guide decision makers in aligning with regulatory and operational demands. Evaluated through expert interviews, the framework proves its relevance and adaptability to evolving regulatory requirements. It serves as a practical tool that supports strategic decision-making and enhances competitiveness in the field of digital finance. Additionally, it features an AI based exploratory component for further research.

Keywords: Digital Payments, Marketplace Platforms, Regulatory Compliance.

1 Introduction

Platform businesses are digital ecosystems/digital marketplaces that ease interactions between different user groups, typically consumers and producers, by providing a technological infrastructure for value exchange (Parker et al., 2016; Oteng Agyeman et al, 2021). Unlike traditional linear businesses, digital platform models use network effects, meaning their value increases as more users join (Evans & Schmalensee, 2016). Examples include e-commerce businesses like Amazon, ridesharing like Uber, food services like Just Eat, and financial technology platforms such as PayPal. These businesses rely on data, algorithms, and user engagement to optimise transactions and create competitive advantages. Their success depends on digital trust, scalability, and efficient governance mechanisms to balance interests among stakeholders (Täuscher, et al., 2017; Täuscher & Laudien, 2018). So-called payment facilitators handle agreements and payment settlements for sub-merchants, making them essential intermediaries in digital commerce (The European Business Review, 2021).

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As a highly regulated domain digital payment facilitation requires compliance with regulations like the Payment Services Directive (PSD), the E-Money Directive, and Anti-Money Laundering (AML) (European Commission, n.d.a.). These regulatory demands often force digital marketplaces to outsource their payment facilitation service to specialised providers like Adyen or Stripe, avoiding the operational complexities of managing these processes in-house (European Commission, 2017).

This research presents a decision-making framework designed to support digital marketplace platform owners in determining whether to facilitate payments in-house or outsource this function. The framework employs a criteria-based questionnaire to capture platform-specific needs and guide licensing decisions, followed by a self-assessment to evaluate operational compliance requirements. Based on these inputs, it produces actionable insights. The framework offers practical value through structured guidance, a user-friendly Excel tool, and alignment with EU financial regulations. It addresses a significant gap in the literature by providing a systematic approach and clearly defined criteria for navigating the complex challenges of payment facilitation, including regulatory compliance, technological integration, financial investment, and operational security.

1.1 Research Methodology

Design Science Research (DSR) was chosen as the methodological foundation for this research due to its focus on creating practical, solution-oriented artefacts that address real-world problems. In this context, DSR aids in the development and evaluation of a decision framework for marketplace platforms that supports strategic decision-making regarding in-house payment processing and financial license selection. The research follows Hevner et al.'s (2004) "Design Science in Information Systems Research," which employs a five-phase framework to guide the research process.

The first phase, “Problem Awareness”, involves identifying the decision-making challenges that marketplace platforms face when determining whether to support payments internally and select appropriate financial licenses. This phase highlights the regulatory complexities and operational considerations. Next, during the “Suggestion Phase”, a hybrid decision framework for marketplace platforms is proposed, integrating Model-Driven Decision Support System (MD-DSS) and Knowledge-Driven Decision Support System (KD-DSS) to simplify and streamline the decision-making process. In the “Development Phase”, a Microsoft Excel-based artefact is created, leveraging Microsoft Excel’s Visual Basic Application (VBA) functionalities to assist decision-makers with an entry-level technical know-how.

The artefact’s design integrates criteria and requirements based on regulatory guidelines and business practices, facilitating the systematic assessment of licensing options such as Payment Institution (PI), Electronic Money Institution (EMI), or banking licenses. The iteratively conducted “Evaluation Phase” ensures practical applicability and adaptability. Insights gained are used to refine the framework, improving its reliability and relevance for industry professionals. In the final “Conclusion Phase,” the research summarizes key findings, validates the framework’s effectiveness, and offers recommendations for further development and future research.

1.2 Problem Statement

Payment services within digital marketplaces may offer advantages like streamlined transactions, and increased customer convenience. However, it also introduces risks, such as supplier dependency, misaligned processes, differing quality standards, and limited control over suppliers' progress (Dinu, 2015). For digital marketplaces, facilitating payments in-house with appropriate licenses, such as those held by Zalando Payments GmbH or similar entities, can enhance the customer experience, automate processes, and unlock additional revenue streams (Exact Payments, n.d.; European Commission 2017).

Despite the importance of payment facilitation in digital marketplaces, based on literature review (section 2) we discovered, there is a significant lack of structured criteria and decision frameworks to guide platform owners in evaluating in-house solutions versus outsourcing. This gap highlights the need for a comprehensive decision-making framework tailored to guide decision makers in navigating payment facilitation and licensing choices effectively.

1.3 Research Questions

This research focuses on determining structured requirements to design a decision framework for marketplace platforms, including relevant criteria for platform businesses in the EU, to manage payment facilitation. This leads to the following central question: What legal, regulatory, and literature-based factors influence payment facilitation for marketplace platforms in the EU? Based on the literature review, the following research questions were derived:

1. **Decision-Making in Payment Facilitation:** How can small marketplace platform providers assess the viability and strategic potential of implementing a digital payment solution?
2. **Regulatory Frameworks:** What are the key regulatory alternatives for payment facilitation in digital marketplace platforms within the EU?
3. **Evaluation Criteria**: What key factors and evaluation criteria should digital marketplace platform providers consider when choosing a payment facilitation model?
4. **Decision Support Artefact:** Can a structured decision-supporting tool help potential marketplace platform providers make informed decisions about their payment facilitation strategies?

2 Literature Review

To establish a contextual foundation, we combined methodological rigor with insights from academia and practice. The literature review focused on (1) digital marketplace platforms, (2) financial licensing in Europe, and (3) decision-support systems. Additionally, qualitative interviews with subject matter experts were conducted to enrich the findings with practical perspectives.

2.1 Marketplace Platforms

Digital marketplace platforms act as intermediaries, facilitating transactions and offering services like technology, market reach, and network effects. They help smaller enterprises expand globally, enabling competition without requiring significant investments or extensive networks (Singh et al., 2023). Digital marketplace platforms often function as both operators and sellers, requiring advanced systems to manage supply, demand, and innovation. The role of marketplace platforms is essential in retail's digital transformation (Wulfert & Schütte, 2022). Digital marketplace platforms facilitate payments, to ensure efficient, secure transactions between a diverse set of consumers and sellers, while also supporting their own revenue generation and operational needs (Checkout.com, 2023).

2.2 Finance Licensing in Europe

The European Banking Authority provides the regulatory standards and guidelines under the revised Payment Services Directive (PSD2), which introduces the E-Money Institution (EMI) and Payment Institution (PI) as additional finance licenses. The national regulators in EU member states are responsible for the implementation and enforcement of PSD2 (European Banking Authority, 2024). Figure 1 provides a simplified overview of financial licensing and the authorities that enforce the licensing in the EU and European Economic Area (EEA).

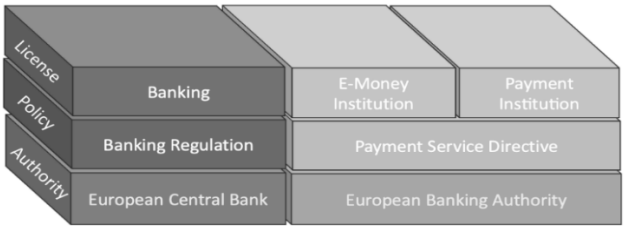

Fig 1. Finance Licensing and Respective Authorities in the EU.

Table 1 shows the characteristics of license types in the EU and EEA financial regulatory framework (Dobler et al., 2021; Sloboda, 2020; Solaris SE, 2022). All three licenses enable digital financial services across the EU and EEA, with varying degrees of operational flexibility. The application process is the most complex for a banking license and simplest for an EMI license according to Dobler et al. (2021), Sloboda (2020) and Solaris SE (2022).

2.3 Business Decision Support

Companies that plan to integrate digital financial services within their digital marketplaces may also need to consider the complex accompanying decision-making tasks relevant to making this choice, e.g., investment decisions, financial regulatory compliance establishment, technology integration, and data security.

A decision framework for marketplace platforms could be a valuable tool for comparing relevant requirements, assessing their impact, and deciding whether and which of the financial services makes sense. An effective decision-making process is crucial for the establishment, growth, and sustainability of financial services within digital marketplace platforms in today's competitive, rapidly evolving sector (Lee & Shin, 2018).

Table 1. Overview of European Payment Licenses and their Characteristics.

	Banking License	**EMI License**	**PI License**
Definition	Permission for a company to operate as a bank.	Authorisation to provide payment services and issue e-money; no traditional banking service.	License for entities executing payment transactions and services.
Services Offered	Deposit-taking, lending, payment services, investment activities.	Issuing e-money, payment services, IBAN accounts, payment cards, e-wallets.	Payment transactions (credit transfers, direct debits), money remittances, a.o.
Capital Requirements	Varies, based on the size and risk profile.	Minimum of EUR 350’000.	Minimum of EUR 125’000.
Regulatory Oversight	Subject to robust regulatory standards for financial stability and consumer protection.	Specific regulatory requirements for the safekeeping of client funds and operational stability.	Regulated to ensure secure payment services and consumer protection.
Operational Flexibility	Less flexibility due to stringent regulatory requirements.	Operational flexibility and quicker innovation due to fewer regulatory restrictions.	Focused on payment services with some operational flexibility.
Depositor Compensation Scheme	Required to contribute to a depositor protection scheme.	Not required to contribute since they cannot take risks with customer money.	Not typically required to contribute to a depositor protection scheme.
Passporting Rights	Full banking services can be offered across the EU and EEA.	Services can be offered across the EU and EEA.	Services can be offered across the EU and EEA.
Applicability	Traditional retail banks and banks with innovative business models.	Non-banks, fintech firms, subsidiaries of phone companies, payment providers.	Credit card processors, payment account operators, remittance businesses, foreign exchange businesses, a.o.
Application Process	More complex and lengthy due to comprehensive regulatory assessments.	Simpler and shorter, more accessible for start-ups/small companies.	Less complex than a banking license but more involved than an EMI license.

To find a basis for a decision framework for marketplace platforms, Decision Support Systems (DSS) were analysed. One of the first DSS, developed by Gorry and Scott Morton (Sprague, 1973); integrates management activities through a process involving (1) problem identification, (2) developing alternatives, and (3) selecting and implementing solutions.

According to Lunenburg (2010), decision-making is the process of choosing among alternatives to achieve a desired goal. He advocates a systematic approach that includes (1) identifying the problem, (2) generating alternatives, (3) evaluating these alternatives, (4) choosing the most suitable one, (5) implementing the decision, and (6) evaluating its effectiveness. The rational model presents decision-making as a logical, structured process and assumes that decision-makers have access to all relevant information, allowing them to identify all alternatives and predict the outcome of each alternative.

Decision-making involves choosing among alternatives to achieve an objective, such as maximisation, minimisation, or reaching a nominal value. The complexity of this process often necessitates multi-criteria and multi-attribute analyses, leading to the development of digital DSS. In digital DSS, decisions are classified as programmed or non-programmed, with programmed decisions being well-defined and routine, where standards and procedures can be established for execution by anyone (García-Alcaraz et al., 2023).

Digital DSS are interactive, computer-based applications that assist decision-makers by leveraging data to address semi-structured and unstructured identified problems; they can be adapted to changing needs without automating decisions. MD-DSS stands for Model-Driven Decision Support System. A MD-DSS allows users to manipulate model parameters through an accessible interface to conduct "what-if" analyses and evaluate different scenarios (Power et al., 2007). A Knowledge-Driven Decision Support System (KD-DSS) or Knowledge-Based DSS (KB-DSS), relies on expert knowledge to support process. Unlike Data-Driven DSS, which extracts insights from large datasets, KD-DSS focuses on applying domain-specific knowledge, often captured in knowledge bases or expert systems, to guide decisions (Chiche, 2019).

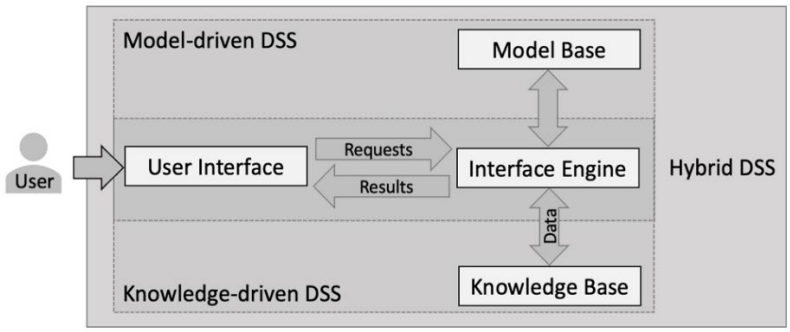

Fig 2. Conceptual Schema of Decision Support Systems (Nižetić et al., 2007).

Figure 2 illustrates a conceptual schema of MD-DSS integrated with KD-DSS into a hybrid DSS. It shows the interplay between the user (interface) which sends requests to the inference engine. In a hybrid DSS, the interface engine combines data from a knowledge base with a model base to generate results which are sent back to the user interface and interpreted by them (Nižetić et al., 2007). Based on the application areas of the respective DSS classifications, the research concentrated on leveraging KD-DSS, potentially combining with Model- MD-DSS, within a cooperative DSS approach.

3 Research Design

This research employed Design Science Research (DSR) in alignment with design-oriented research principles, which focus on creating artefacts to address specific problems and generate measurable benefits (Österle et al., 2011).

The methodological approach followed Hevner et al.'s five-phase framework: (1) problem awareness, involving comprehension of the identified problem, (2) suggestion, proposing a potential solution, (3) development, constructing a practical prototype artefact, (4) evaluation, assessing the artefact's effectiveness, and (5) conclusion, summarising results and discussing future perspectives. The development and evaluation phases were conducted iteratively, ensuring continuous refinement and validation (Hevner & Chatterjee, 2010).

3.1 Decision Framework

The developed artefact, a decision framework for marketplace platforms, assists decision-makers in determining whether and how to offer a digital payment facilitation in-house and in selecting the appropriate license model (Table 1). By combining MD-DSS and KD-DSS, the hybrid DSS simplifies licensing decisions through defined criteria and regulatory requirements. The framework uses payment facilitation criteria of a marketplace platform to evaluate license options via MD-DSS and outlines key compliance and operational integrity requirements, utilising KD-DSS to navigate regulatory aspects.

3.2 Criteria

The criteria outlined in Table 2 are designed to guide decision-makers through the process of determining whether to handle digital payments in-house. These criteria, initially drafted from the literature review and based on the services offered by each license (Table 1), also incorporate insights from (European Commission et al., 2023a, 2023b).

During the evaluation, the criteria were critically assessed for accuracy and comprehensiveness, leading to further refinement. Based on the MD-DSS framework, these criteria provide a structured approach for evaluating the factors that influence the choice of a specific license. The selection between a PI, EMI, or Banking license depends on the evaluation of these criteria, summarised in Table 1.

3.3 Requirements

Based on the evaluated required license through the companies' criteria, examining the corresponding requirements is essential for ensuring compliance, operational efficiency, and competitive advantage in the payment processing landscape. Using the relevant licensing knowledge from Table 1, the corresponding requirements are defined in Table 3. These requirements are assessed and refined during the evaluation process to incorporate KD-DSS into the artefact, helping generate knowledge-based suggestions.

Table 2. Criteria for Marketplace Platform Businesses to Facilitate Payments.

Criteria	Description
Splitting revenues	The platform is part of the finance flow between the consumer and producer segments and splits revenue among multiple producers.
Pay out full sales	The platform is part of finance flow between the consumer and producer segments and pays out full sales to producers or services in case there is a payment delay on the consumer side.
Covering financial loss	The platform is part of the finance flow between the consumer and producer segments and pays out full sales to producers in cases of fraud or insolvency on the consumer side.
Applying platform vouchers	The platform applies vouchers paid by the platform or other sponsors in consumers' baskets which contain products of multiple producers.
Stored value	The platform offers their consumers to store monetary value which can later be used to buy products or services from the producer segment within the platform.
IBAN accounts	The platform wants to offer IBAN accounts to their consumer or producer segments to and from which funds can be sent a managed.
Payment cards or e-wallets	The platform offers payment cards or e-wallets which consumers can use to pay for products or services within or outside of the platform.
Store payment information	The platform stores payment information of their consumers within the platform to enable payments without entering the payment credentials.
Lending	The platform lends funds to their consumer or producer segments or allows negative balances on payment cards, e-wallets or IBAN accounts.

Table 3. Requirements for Marketplace Platform Businesses to Facilitate Payments.

Requirement	Description
Regulatory Licensing	The required licensing for payment facilitation is either PI, EMI or banking (Table. 1) and depends on the criteria of the platform.
Capital	The minimum capital requirements of the platform depend on the evaluated license which is closer specified in Table 1.
Subsidiary organisation in EU	In case the payment facilitation is made in-house (by using EMI or banking license), a subsidiary organisation is required within the EU.
Technological infrastructure	To facilitate payments the platform must build or acquire the necessary technology stack for payment processing, including secure servers, payment gateways, and fraud detection systems.
Security	Implement state-of-the-art security measures for fraud prevention, encryption, and secure data storage. To store payment credentials or to issue payment cards PCI-DSS is an obligatory requirement.
Expertise and staffing	Recruit or develop expertise in regulatory compliance, financial operations, and cybersecurity.
Governance mechanisms	Establish a governance framework to oversee payment operations and ensure activities to maintain compliance with regulatory standards and guidelines.
Risk Management	Implement risk management processes to facilitate secure payments, aimed at identifying and mitigating potential risks in the transactions.
Compliance mechanisms	In case the payment facilitation is made in-house by the platform, which is the case with EMI or banking license, the platform must implement mechanisms for compliance with financial regulations, including anti-money laundering and counter-terrorist financing controls.

3.4 Artefact

The Microsoft Excel-based artefact is designed to streamline decision-making for marketplace platform managers. By integrating Visual Basic for Applications (VBA), the tool extends Excel's native functionalities, leveraging its widespread usage and economies of scale. This integration ensures that even users with minimal technical expertise can operate the Decision Support Artefact effectively. Through a structured decision-making framework, the artefact simplifies the complexities of navigating regulatory landscapes based on the operational and business demands of marketplace platforms within the EU. It serves as a practical application of theoretical models, translating abstract concepts into actionable strategies. The artefact (excel-based file) is available at https://drive.switch.ch/index.php/s/PxA18fxJW8oZ39C.

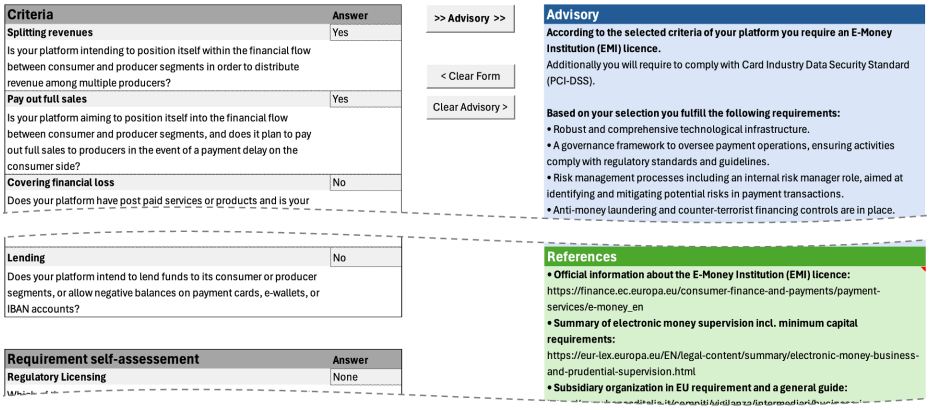

Fig 3. Cropped Image of the Decision Support Artefact.

The artefact provides several sheets, while the "Decision Support" Sheet includes the core functionality, designed to help marketplace platform managers assess their payment facilitation needs and corresponding licensing requirements (Fig. 3). It features a two-part questionnaire: the criteria questionnaire and the requirement self-assessment, both essential for generating tailored advisory and reference content.

The criteria questionnaire section of the framework captures specific details about the marketplace platform's payment facilitation needs. The information gathered is used with MD-DSS to determine one of several license options for supporting payments in the EU.

The requirement self-assessment section helps users evaluate compliance with license requirements, identifying areas that are fulfilled and those needing further effort. Insights from expert evaluations refined the advisory results, improving clarity and incorporating helpful hints and references. Initial knowledge, summarised in Table 1, was transformed into tailored suggestions, which were later enriched with interview feedback, and a references section was added to provide actionable guidance.

An additional "AI" sheet presents an experimental OpenAI-based advisory designed to challenge the artefacts advisory results. This aims to facilitate and support further research in this field.

3.5 Evaluation

Two iterative interview rounds allowed for incremental enhancements to the artefacts design and usability. Five experts, anonymised for confidentiality, participated, representing marketplace platforms, payment service providers, and banks, with experience ranging from 10 to 20 years. Interview questions targeted three areas: the relevance of the criteria, the feasibility of the requirements, and the artefact's usefulness in decision-making. The iterative process led to notable enhancements, such as clarifying criteria, separating risk management as a standalone requirement, and adding references for actionable guidance. Key suggestions requiring further research, like developing a web-based tool, were noted for future iterations. The evaluation validated the artefact's effectiveness as a decision-making aid, demonstrating its potential to assist marketplace platforms in addressing payment facilitation challenges.

4 Conclusion and Outlook

This research examined digital payment facilitation for EU marketplace platforms, focusing on regulatory frameworks, decision-making criteria, and the development of a decision support artefact to evaluate in-house payment facilitation versus outsourcing.

Platforms like Airbnb and Uber enable global market access but face challenges from regulations such as PSD2 and AML laws. While outsourcing reduces costs, in-house facilitation offers sufficient control, customer experience, and revenue potential. The EMI license emerged as the most suitable option due to its flexibility and lower regulatory hurdles. Using the Design Science Research (DSR) approach, the research developed a user-friendly Excel-based framework to address regulatory and operational needs. Expert feedback validated its relevance and potential to enhance decision-making. The research opens the following fields for future research and development: (1) Enhancing Usability: Transform the artefact into an interactive, web-based tool for greater accessibility, (2) Broadening Scope: Link the artefact to related topics for comprehensive decision-making resources, (3) Tailoring Insights: Further evaluate and customise the framework through stakeholder feedback. (4) Regulatory Updates: Align the artefact with evolving EU regulations, such as PSD3. (5) Data Integration: Incorporate AI and advanced analytics for improved foresight and adaptability.

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