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Business KPIs Based on Compliance Risk Estimation

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Abstract
The issue of KPI selection is urgent for sustainable business organization including the financial sector. There are numerous studies devoted to KPIs; however, the European Central Bank (European Central Bank, 2023) insists on the necessity of revising the methodology to improve it and make it based on risk and behavior aspects. This research is an attempt to meet the new vision of the ECB. The authors develop a new approach to the selected KPIs of financial institutions on the basis of risk indicators. The PLS-SEM method was used to construct and test the model, representing the company's compliance function and considering various risk categories. The significant relationship between compliance procedures and risk factors was confirmed by the constructed model. The study results not only meet the ECB's new approach but also contribute to the scientific area of choosing sustainable indicators for sustainable business. Empirical analyses from the study decisively highlighted a pronounced correlation between strict compliance with the established rules and proficient risk management practices. In tandem with the ECB's guiding principles, the conclusions derived from this research not only complement the existing body of knowledge but also offer a novel perspective on the essence of the KPI selection. Conclusively, this research confirms the significance of risk-aware KPIs in guiding financial entities toward a trajectory of sustained excellence and growth.

Key Words: KPI, Fintech, Risk, Compliance, PLS-SEM, Financial institutions

JEL Classification: G20, D04, D81

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1. Introduction

The ever-changing world and sustainability concept put forward brand-new requirements for all spheres of business. This is especially true for financial institutions since financial companies fully depend on developing other businesses, and more and more new realities are becoming actual for financial institutions.

Modern shifts in the business landscape, including reduced product longevity, increasing product variety, the expansion of distributed production methods (Stricker et al., 2017), the rise of digital products, and the impact of both the pandemic and its aftermath, have greatly influenced how businesses view and prioritize KPIs.

According to Parmenter, "In numerous institutions, Key Performance Indicators (KPIs) are not functioning effectively. These KPIs are frequently assembled haphazardly without adequate knowledge,

rendering them meaningless." Parmenter, 2015 The European Central Bank especially emphasizes this factor for financial institutions, considering that existing KPIs used by financial institutions often lack clarity and are excessively financial-focused, sidelining essential aspects like risk and behavior. (European Central Bank, 2023). This time difference between the two articles shows that the KPIs selection approach for financial institutions has not changed within the last eight years. Therefore, the issue of developing a new approach to KPI selection is fully applicable to financial institutions. The financial companies of various types continue using KPIs that were actually decades ago, ignoring that the altered environment cannot always be described by the traditionally used KPIs. The new trend on sustainability also requires reflecting in KPIs. The fact that FinTech companies occupy their position in the market of financial services even deepens this issue since the traditional KPIs cannot fully demonstrate all the aspects of the functioning of the FinTech companies, especially considering the fact that these companies, by their nature, are more sustainable compared to traditional financial businesses.(Merve et al., 2022) It creates incentives for the researchers to think about new fields to be reflected in KPIs.

There are some groups of KPIs that are presented not by numerical indicators but by random selection of descriptive characteristics. The authors are sure it is high time to establish scientifically based criteria for the selection of KPIs, even in such areas that previously were supposed to be impossible for numeric measurement, for example, compliance.

In general, the compliance concept is discussed by scientists, for example, (Losiewicz-Dniestrzanska, 2015; Momot et al., 2017; Mursalov, 2021; Zulfikar et al., 2020); however, the methodology of assessment of compliance risks and compliance implementation is not the subject of discussion of scholars. Therefore, this article has an objective to cover the existing gap in theoretical studies and also to create certain methodological steps that could allow practitioners to apply these principles in practice for financial institutions of different types.

Company sustainability depends on many factors, and one of the most important of them is compliance. Nevertheless, it is the sphere in which each institution selects the criteria according to the personal views of the manager without any scientifically based procedure. It worked for decades. However, today, we are in a transformation period when purely scientific issues come into practice: artificial intelligence and machine learning (Maté et al., 2014; Siedler et al., 2020). The sustainability concept also puts forward certain requirements. The ECB, the regulating institution for the European financial sector, also insists on developing new approaches to the issue. (European Central Bank, 2023) Therefore, it is possible to discover the scientifically based approaches to the measurement of KPIs for such factors as compliance, which have had only descriptive characteristics for decades.

The article's authors aim to introduce a brand-new approach towards KPIs selection, corresponding to the contemporary realia and complementing the existing KPIs, which financial companies actively use; it will allow the financial institutions to choose the KPIs more precisely and to cover the additional areas. On the one hand, these KPIs serve as early warning indicators and provide conclusions regarding any imminent risks. The company can then take the preventative or mitigating measures in a timely manner – or choose to assume risks knowingly. On the other hand, the findings provide a foundation for optimizing the internal processes (Stefan Gröger et al., 2021) to correspond to both the new vision of the ECB and sustainability principles. The Key Performance Indicators (KPIs) used for financial management can provide insights into the financial and capital adequacy risks that organization faces. These risks are evaluated through various KPIs that measure the organization's financial health, stability, and ability to meet its capital requirements. By analyzing these KPIs, organizations can assess their exposure to financial and capital adequacy risks.

The authors use the risk-based approach to the creation of KPIs in relation to compliance. The choice of risks as a basis for measuring compliance KPIs is not occasional. Certainly, all financial institutions consider risks, try to predict and forecast risky situations, and have special departments working on risk mitigation. The risk assessment methodology is well-developed and could be applied

without difficulties, and the authors put forward the hypothesis that selecting the compliance KPIs for financial institutions should be based on Key Risk Indicators (KRIs).

The authors provide the research on the basis of fintech companies as contemporary representative of the EU financial institutions.

This study is oriented on studying the factors that influence the choice of KPIs in Fintech. Moreover, the authors demonstrate that this approach to developing or selecting the KPIs is applicable to Fintech of different types operating in different countries.

To achieve this goal, the authors consider the theoretical aspects of KPIs for Fintech, compliance issues, and risk issues, which should be used as a basis for selecting the KPIs. The risk factors will be used in a statistical model demonstrating which risks should be used as a basis for selecting KPIs. The Discussion and Conclusions sections demonstrate the existing problems in using this approach and the further directions of the research.

2. Literature review

2.1 Risks, their nature and estimation

The Economic Times suggests that risk relates to the unpredictability concerning any divergence from anticipated profits or results. ("What is 'Risk,'" 2023) Risks have different natures, origins, implementation, and impacts. For instance, financial (Civelek et al., 2023), bankruptcy (Ključnikov et al., 2022a), and export risks (Ključnikov et al., 2022b) have been some of the vital risks factors that small and medium enterprises face in their operations. Nevertheless, two risk components should be considered as factors necessary for risk assessment, they are vulnerabilities and threats. Vulnerabilities are weaknesses that could be exploited for some actions which could result in danger for the company. (Cox, 2008; Dvorský et al., 2019; Smart et al., 2013; Torabi et al., 2016; Varga et al., 2021; Wang et al., 2018; Wei et al., 2021). Threats are events or conditions that potentially cause undesirable consequences. (Cox, 2008; Fülöp et al., 2022; Varga et al., 2021; Imran et al., 2022) Threats and vulnerabilities acting together cause a dangerous situation for the company. Another important factor is the likelihood of threats and vulnerabilities implementation, and likelihood is based on objective data on the occurrence of the implementation of vulnerabilities and threats during the reporting time in practice. In other words, we measure how often a certain vulnerability or threat appears in practice. (Aven, 2016)

The authors carried out a study on the risks associated with firms active in the financial sectors under the Fintech business model. They delved into vulnerabilities and threats to gauge these risks. Specifically, it's crucial to determine the consequences of these risk elements. Typically, risk specialists use their expert insight to evaluate these consequences. Such impacts are judged based on the expertise of risk professionals. The term 'impact' denotes the extent and kind of damage resulting from the activation of one or more vulnerabilities.

It is necessary to specify the groups of risks, which affect the performance of the Fintech and are connected with compliance issues. Compliance refers to the act of adhering to established rules and regulations, while enforcement represents the methods employed to ensure such adherence is maintained.(Bergseth et al., 2023) The authors identified the following groups as bearing risk for the businesses' compliance:

- Governance Risks demonstrates that there is a likelihood that the policies procedures, and processes implemented within the company, – all crucial components of supervision and decision-making – will not work as intended. Governance risks concern the directors' choices for the framework, membership, and leadership of the board. The inventiveness and sturdiness demonstrated by the company in relation to the processes for compliance with the pertinent

legal framework, including the caliber of reporting lines, are related to governance risks. (Schmid et al., 2011; Ciobanu et al, 2019)

- Health and Safety Risks - A possibility that the Company will come into contact with a health and safety risk that could endanger, hurt, kill, or sicken an employee at a particular worksite. (Silva et al., 2012)
- Financial Risks - The probability that a company will suffer a financial loss on an investment or business endeavor. (Valaskova et al., 2018; Zhang, 2022; Lacko et al., 2023)
- Capital Adequacy Risks demonstrate the situation with the capital of the company and risks, associated with it, as well as situation and risks, associated with the availability of additional capital, and the amount of capital needed to support current and expected business activities. (Nguyen et al., 2019; Zsigmond & Mura, 2023)
- Environmental/External Risks - Risks brought on by unforeseen economic developments that are beyond the company structure's control. (Hummel et al., 2021)
- Law and Regulation Risks – include the risks that the company will experience serious problems in the financial sphere, loss in reputation or legal harm if regulatory compliance risks are not monitored, controlled, eliminated, or significantly reduced. (Laeven et al., 2009)
- Strategic Risks - Risk of loss brought on by unfavorable business choices that are not well aligned with strategic goals, improperly carrying out procedures and policies intended to achieve the stated goals, and a decreased capability of adapting to macroeconomic and market dynamics. Strategic hazards include those posed by engaging in certain business activities. (Kunz et al., 2021; Nicolescu et al., 2020)

Accurate awareness of the risks, actual for any Fintech business is exposed is necessary for the risk-based strategy to work effectively. Moreover, developing a new approach to selecting KPIs for financial institutions is important.

2.2 Compliance concept

The concept of compliance is well-studied by scientists (Losiewicz-Dniestrzanska, 2015; Momot et al., 2017; Mursalov, 2021; Zulfikar et al., 2020) and well-understood by practitioners since it is an important component of functioning business in a strictly regulated international environment. This factor is essential for both external and internal operations, and practitioners allocate a lot of attention to this part of their functioning. The compliance concept includes a set of rules and policies, various laws and regulations, procedures and guidelines, and so on. Compliance in each sphere of business is managed to a certain degree. For financial institutions, compliance issues become of special importance since following this set of rules and regulations is a preventive measure for data protection, cyber-security, and stopping illicit practices, and it is facilitated by process automation, globalization, and ethical requirements (Mursalov, 2021; Rastogi et al., 2022; Why RegTech is Becoming More and More Important for Compliance in Banks, 2021; Zulfikar et al., 2020). It is a composite activity that encompasses a variety of financial institution-related regulated activities, including management of human resource health, environmental and external activities, laws and regulations, and corporate strategic planning. (Alaassar et al., 2023; Thottoli et al., 2022) The changed financial markets, new realities of business functioning and global scope of operations make it even more urgent. The strategies developed on the basis of compliance with existing regulations increase the efficiency of decision-making processes and prevent or mitigate risks (Mursalov, 2021; Zulfikar et al., 2020). Additionally, the compliance function is an essential part of the digital production of the financial institution or any other Fintech company (Buka et al., 2022; Cernisevs et al., 2023; Esmaeilian et al., 2016; Mayer et al., 2021; Paritala et al., 2017; Popova et al., 2023; Suvarna et al., 2020).

One of the most serious points for legal regulation is human resource management (HRM). The paradigm for human resource management (HRM) has been changing over the last few years (Jatobá et al., 2019a; Oswal et al., 2015), and this trend is anticipated to continue. Changes in technology and viewpoints on talent retention are the main forces behind the shift (Jatobá et al., 2019a). The focus on succession planning is a significant additional element in the change. Since many CEOs, Presidents, and other influential figures in businesses and corporations are near retirement age, succession planning is increasingly important in the position of the HR professional. (Boon et al., 2019; Garengo et al., 2022; Jatobá et al., 2019b)

The fact that the rules have altered is another major factor influencing HR's paradigm shift. New laws and compliance requirements were implemented in the midst of corporate scandals and millions of dollars in funds that were wrongfully taken (Lazarova et al., 2023; Stahl et al., 2020). Legislation pertaining to health and safety is also constantly changing and evolving (Rodríguez-Martín et al., 2023). Keeping up with changes in health and safety laws is important, but it is not the only aspect of HRM administration. Laws pertaining to health and safety also mandate that training records be kept in good condition and that program managers are aware of the regulations that are relevant to them. Due to the fact that regional or national laws do not apply to every company and that health and safety regulations vary between jurisdictions, this can be challenging. It is important for HR professionals to comprehend which laws are relevant to their workplace and how to operate in compliance with those laws. HRM strategies now incorporate health and safety measures. Instead of mere compliance requirements, health and safety have become integral to companies' broader objectives, including talent retention and minimizing downtime. Tangible returns from investing in areas like disability management, proactive wellness programs, preventive actions, and robust onboarding and training are evident (Ryan et al., 2018). Firms leverage these health and safety initiatives to achieve their overarching targets, especially by using them to avert injuries that result in lost work hours and to sustain peak productivity (Mustard et al., 2023).

Another highly regulated area is the environmental factor and focus on sustainability. Everyone is concerned about how business actions can affect the environment, from government officials to consumer advocacy organizations. This has quickly resulted in a desire for sustainable events in the financial sector. Considering the existing emphasis on environmental degradation, the relationship towards business activities as well as companies can change in the nearest future. Any institution, company, organization, as well as managers can use sustainable event management guidelines; sustainable event management permits to diminish the negative impact on environment and make business activities more environmentally friendly ("A Circular Evaluation Tool for Sustainable Event Management – An Olympic Case Study," 2018; Dickson et al., 2010; PATRYCJA GULAK-LIPKA et al., 2020). There presupposed the whole list of procedures to make sure that the business activities have no unfavorable environmental effects on the area, and that the local people and the country society do not suffer. Any industry that has embraced sustainability has realized that for a policy or program to be successful, it must be tailored to the particular requirements and procedures of that industry. To handle the unique challenges and realities, sustainable event management should be put into practice (Getz, 2017; PATRYCJA GULAK-LIPKA et al., 2020). Nevertheless, significant improvements in environmental sphere cannot be made without financial support sufficient for the presupposed activities. (Elheddad et al., 2021) Summarising the above said, protection of environment should develop alongside financial instruments in a synergy. (Tao et al., 2022)

The process of strategic planning is aimed at developing a company's desired future state and establishing development direction, determination of the goals and ways for their achievement. The strategic planning is part of compliance (Dvorský et al., 2020) A strategic plan makes sure that everyone is contributing to the same aims and objectives. Planning out the future over a longer period of time – more than a year – gives the business greater insights into upcoming investments in people,

capital, IT, and other resources, as well as when financial institutions will need to make those investments (Gavurova et al. 2022a).

A compliance program needs to be integrated into a financial institution's forecasting in order to be genuinely effective (Broby, 2022). The necessary compliance resources must be considered if new products or markets are being considered. For instance, if a financial institution chooses to offer loans, will the compliance team's understanding of the loan's disclosure, servicing, and reporting requirements be sufficient? If not, how challenging will it be to learn this information? Does the core system adequately account for the compliance requirements for these loans? If not, how much would it take to upgrade the systems? These expenses should be taken into account during the strategic planning process. (Giraudou et al., 2014; Kryvych et al., 2020; Ugboro et al., 2011)

All aspects of compliance within the financial institution need to be managed and controlled (Losiewicz-Dniestrzanska, 2015) The possibility to measure these aspects are expressed in specific compliance metrics and Key Performance Indicators (KPIs). They demonstrate the readiness of the company to comply with internal and external policies as well as governmental. Internal audit, compliance education, policy enforcement, and risk management are typical compliance responsibilities.

2.3 KPIs

The authors highlight that given the diverse and often distinct processes within every business or its segment, there's a need for a methodology to pinpoint a set of appropriate and essential KPIs. It refers to compliance factors at the full scope. The financial institutions use the list of policies, laws, and regulations, which they should keep to, and this list serves as KPIs for the compliance factors (Gavurova et al. 2022b). However, there is no unique list of recommended documents for all financial institutions, since they operate in different countries with different national legislation systems, they have different products, different processes, different lists of cooperation partners, and so on. Therefore, the unique list cannot exist. As a result, the KPIs are created not on the basis of scientifically proven approach, but on the basis of personal opinion of managers, and this choice is not always reflecting the objective situation.

The authors offer to use the risk indicators as a basis for measuring the compliance KPIs. The risks measurements and procedures are well-described and are easily applied in practice. This study shows that some risk indicators fully demonstrate the compliance KPIs. Moreover, this article considers the risks as a whole, rather than as individual problems, enabling the businesses to assess not only how various risk groups interact but also how their combined effects may influence the business performance. The authors employ a comprehensive methodology to discern the impact of managerial, financial, and technological facets of exclusively digital services on a company's risk of non-compliance. By examining the key risk indicators of the particular business, this research can be used to create the approach for choosing Key Performance Indicators for this particular enterprise.

Relying solely on existing traditional key financial indicators (KPIs) is insufficient to navigate the digital transformation of the economy effectively. The dynamic and rapidly evolving nature of the digital era requires organizations to adapt and embrace new sets of KPIs that encompass a broader range of metrics beyond traditional financial indicators. Incorporating digital-specific KPIs is essential to capture the complexities of digital transformation, including customer engagement, online presence, data analytics, technology adoption, innovation, and agility. By incorporating these additional KPIs, organizations can gain a better understanding of their digital performance and make serious strategic decisions to thrive in the digital economy. KPIs should truthfully represent a company's status and offer adequate clarity in processes for effective strategic and tactical oversight, underscoring the existing deficiency. (Siedler et al., 2020)

Reassessment of compliance-related Key Risk Indicators (KRIs) is required in response to changes in the external world (Stratigaki et al., 2016) Key Risk Indicators (KRIs) in the compliance

sphere describe and pinpoint dangers associated with the financial institutions breaking the law. It can be used independently or with other fixed events linked to specific business risks, like governance risk (Brandis et al., 2019; Junior Nascimento da Silva et al., 2017; Ramalingam et al., 2018) To protect the business from risks to its image, legal liability, and other factors, these Key Risk Indicators must be reviewed on a regular basis.

When a business possesses a deep grasp of its risks, it can precisely pinpoint and select the proper risk markers. Furthermore, the company can maintain a steady watch on performance using KPIs and additional tools that simplify this task. Hence, the authors contend that for the selection of impactful KPIs in compliance management, one must first examine the risks impacting the business, recognize primary risk markers, and then choose KPIs that detail strategies mitigating risks in those specific zones.

3. Methods

The choice of methods for the research is determined by the set goal and objectives of the study.

3.1. Determination of the risks' groups for the study

The theoretical background assumes the utilization of several risk categories to assess the compliance of a financial institution. These risk categories include Governance Risks, Health and Safety Risks, Financial Risks, Capital Adequacy Risks, Environmental/External Risks, Law and Regulation Risks, and Strategic Risks. (Cernisevs et al., 2023) These risks serve as important considerations for evaluating the compliance of a financial institution and provide a comprehensive framework for risk management and regulatory adherence.

The components and markers of the model were pinpointed in an initial investigation. To achieve this, the authors consulted with five companies successfully functioning in financial and fintech markets in the European Union. For these interviews, the authors use questionnaires unique to risk factors.

The following criteria were applied for choosing the companies for interviewing:
The respondent is a business with EU registration.
The Financial Company Supervisor regulates or oversees the business.
The business employs risk managers or other risk specialists.
The organization deals with payments.

The selected companies have the following features:

- The selected five Fintech companies represent 3 of four major groups of the Fintech business models (Popova et al., 2023) – Financial Fintech, Payment Fintech and Asset Management fintech. The Fintech companies of the fourth existing type do not deal with payments, and correspondently are beyond the scope of this study. Therefore, all areas of Fintech functioning according to the set goal are represented in the study.
- All companies are supervised as – Credit institution, Electronic Money Institution, Virtual Assets management institutions, Payment Initiation Service provider (PISP in accordance with the PSD II (Popova et al., 2023)). Two of them are passported for the service providing across ***all*** EU countries. Therefore, the area of functioning evidences of representativeness of the sample.

Therefore, the authors assume that the selected companies can quite fully represent the fintech companies, operating in the EU.

Each risk occurrence results from the existing weaknesses of a business being triggered by one or multiple threats. To evaluate the potential impact of a threat or the probability of a risk incident, accurate vulnerability values should be employed.

The comprehensive semi-structured interviews with risk experts of financial institutions of various types took place in 2017 and 2022. 5 types of financial institutions were interviewed to select the model's components and indicators. Totally there were defined 217 threats and 78 vulnerabilities. Each threat and vulnerability were described by the value of its impact and likelihood. Overall model is built on (217*2 +78*2)*5 = 2950 indicators values.

The authors created the following criteria to help participating businesses evaluate the effects of threats and vulnerabilities and define its indicators values:

Table 1. **Criteria for assessing internal process threats**

Risk group	Very High	High	Medium	Low	Very Low
Governance	A critical failure occurs when less than a half (>50%) of choices are finally performed. Slow decision-making leads to critical errors that render it impossible to complete crucial duties. The effect jeopardizes the initiative's or organization's viability.	When choices are not presupposed for final performance, there is a failure rate of less than 50%. Making poor decisions causes vital processes to break down, which lowers performance. The continuation of the project, endeavor, or company is in danger.	The last execution is delayed due to a lack of choices. Delays in decision-making affect the business and result in poorer performance, including missed objectives. The company functioning is not in danger, but it still could be thoroughly evaluated.	For the most recent execution, decisions were not given in time. Delays in decision-making affect the business and have a negative impact on performance, including missed objectives. An organization's survival is not in danger, but it could still be thoroughly evaluated..	Execution errors in the internal process.
Health and Safety	Death or major injuries. Toxic Envier Damage >=1'000'000 EUR Damage	Extensive injuries. High Envier Damage <=1'000'000 EUR Damage	External medical. Medium Envier Damage <=100'000 EUR Damage	Some First Aid required. Low Envier Damage. <=10'000 EUR Damage	Insignificant impact. <=1'000 EUR Damage
Financial	>EUR 990,000	EUR 330,000.01– EUR 990,000	EUR 160,000.01– EUR 330,000	EUR 30,000.01– EUR 160,000	<EUR 30,000
Environmental/External	- Hindrance in reaching set goals and financial targets - Prolonged, major decline	- Incident significantly affects the company's strategic goals and/or financial	- The strategic goals, and/or financial outline are mildly influenced by the incident	- Incident has a slight effect on strategic targets and/or financial strategy - Possible	- Incident causes minimal localized harm without broader implications and likely

	in market position, brand reputation, and/or public trust - Notable decrease in employee retention and recruitment	projections - Pronounced dip in market dominance, company's brand worth, and/or public trust - Marked drop in maintaining or attracting employees.	- Short run disturbances to market position, brand reputation, and/or public perception - Minor challenges in keeping or drawing in employees.	repercussions on market dominance, brand prestige, and/or public trust - Outcomes are manageable within regular operations.	doesn't affect the financial strategy - No significant effect on market position, brand integrity, or public trust - Minimal or no challenges in maintaining or attracting employees.
Legal/ Compliance	- Termination of the operation by a decision of the regulatory authority - Court decree	- Operating under external regulatory oversight - Court case	- Significant legal penalties along with internal scrutiny of operations	- Low penalties	- Minor penalties
Capital Adequacy	>50% of the capital	30–50% of the capital	15–30% of the capital	5–15% of the capital	<than 5% of the capital
Strategic Risks	-Reverses progress on one or more of the strategic goal of the company or threat of failure of the strategic plan	- Stop progressing on more than one strategic objective	-Stops progress on one Company strategic goal	- Slow progress on more than one strategic business objective	-Slow progress on one Company strategic goal

Source: generated by the authors.

The below benchmarks are provided to participants for estimating the probability of threats and vulnerabilities:

Table 2. **Criteria for assessing vulnerabilities.**

Very High	High	Medium	Low	Very low
In most situations, the incident is anticipated to happen 90–100%.	There's a high likelihood of the incident occurring in the majority of situations 60–90%.	The incident has an equal chance of happening or not happening 35–60%.	There's a possibility the incident might take place eventually 10–35%.	Incident is likely to happen only under rare conditions 0–10%.

Source: generated by the authors.

3.2. Risk assessment

According to (Abid et al., 2021), the risk is determined by the following formula:

$$IR = Im * L$$

1)

Definitions:
IR – Represents Inherent Risk
Im – Denotes the Risk's Impact
L – Stands for the Risk's Likelihood

The average was taken from the probability and impact of each combination of threats and vulnerabilities to ascertain the inherent risk's likelihood and consequence. When determining the final threat and vulnerability, all elements such as threats, vulnerabilities, impacts, and probabilities are factored in, regardless of multiple threats and vulnerabilities originating from the same risk.

$$Im = \frac{\sum_{i=1}^{n}(Ti_i + \frac{(Vi_1 + Vi_2 + \cdots + Vi_m)}{m})}{n * 2} \quad (2)$$

Definitions:
Im – Denotes the Consequence of the risk
Ti – Represents the Impact of each Threat within the risk category
Vi – Impact from Vulnerabilities
m – Total vulnerabilities within a specific risk category
n – Count of threats within a particular risk group

$$L = \frac{\sum_{i=1}^{n}(Tl_i + \frac{(Vl_1 + Vl_2 + \cdots + Vl_m)}{m})}{n * 2} \quad (3)$$

Definitions:
L – Represents the Probability of the risk
Tl – Indicates the Likelihood of each Threat in the risk set
Vl – Likelihood attributed to Vulnerabilities
m – Count of vulnerabilities in a given risk set
n – Total threats in the specified risk group

The following classification will be used to determine the impact and probability: a numeric value of 1 will correspond to the Very Low or Irrelevant evaluation (VL), value 2 will correspond to the Low evaluation (L), value 3 will correspond to the medium evaluation (M), value 4 will correspond to the High evaluation (H) and value 5 will correspond to the Very High evaluation (VH).

Numerical guidelines for understanding inherent risk scores are set out below. A score of 0 to 5 is deemed Low (L), 10 to 15 is considered Medium (M), 15 to 20 indicates High (H), and 20 to 25 signifies Very High (VH).

The research predominantly used PLS-SEM method (partial least squares structural equation modelling) to concurrently evaluate several statistical associations (W. Chin et al., 2020; Dash et al., 2021; Joseph F. Hair et al., 2021). The decision to use PLS-SEM was based on its suitability for smaller data sets, its applicability to both exploratory and confirmatory research approaches, and its lack of stringent requirements for standard data distribution (Popova & Popovs, 2022; Popova & Zagulova, 2022b)

PLS-SEM is adept at executing a functional causal-predictive study that accounts for variations in the autonomous constructs (W. Chin et al., 2020; Joseph F. Hair et al., 2021). By integrating regression-based path analysis with a comprehensive factor assessment, PLS-SEM facilitates predictions regarding the actions of a unique subject (Mateos-Aparicio, 2011). This methodology also illuminates how both direct and indirect association function and can pinpoint mediator and moderator impacts (Ringle et al., 2020). Many modern specialists lean towards this method (Dash et al., 2021).

The PLS-SEM approach distinguishes between an inner and an outer model. The connections between autonomous and reliant constructs (latent variables) are evaluated by the inner model. In contrast, the outer model focuses on the ties between the model constructs and their designated markers. Latent variables or constructs refer to those variables that aren't directly measurable.

Key performance metrics were treated on the same basis as financial and capital adequacy risks. Other risk categories then decide which model assumptions may have an effect on them. The authors determined that the risk groups selected for the modelling should reflect compliance processes:

- Governance Risk
- Health and Safety Risk
- Environmental/External Risk
- Legal/ Compliance Risk
- Strategic Risk

Financial Risk was the subject of the first set of hypotheses (H1–H5):

H1: There's a direct influence of Governance Risk on the company's KPIs related to compliance.
H2: Health and Safety Risk directly affects the company's KPIs concerning compliance.
H3: External/Environmental Risk directly influences the company's compliance-associated KPIs.
H4: The risk associated with Legal/Compliance directly affects the company's KPIs tied to compliance.
H5: Strategic Risk has a direct bearing on the company's compliance-centric KPIs.

H6–H10, the second set of hypotheses, focused on capital adequacy risk:

H6: Governance Risk directly influences the KPIs of the company related to compliance.
H7: The risk from Health and Safety directly bears on the compliance-focused KPIs of the company.
H8: Risks stemming from Environmental/External factors have a straightforward effect on the company's compliance-tied KPIs.
H9: Legal/Compliance Risk exerts a direct effect on the company's KPIs associated with compliance.
H10: Strategic Risk has an immediate bearing on the KPIs of the company concerning compliance.

3.3. Utilizing the SmartPLS software for model building

The analysis PLS-SEM with the employment of SmartPLS software was implemented in three phases:

There was estimated the validity of the external model. This involved checking the loads for the constructs, which were preliminary specified on theoretical basis; then the model consistency and validity were reviewed. Then the iterations needed for SmartPLS to finalize the evaluation were identified.

The internal (structural) model looked into the connections among the clusters. This was done by examining the effect size (f^2), standardized route values (β), and the determination coefficient (R^2).

A comprehensive assessment of the entire model allows understanding whether the model aligns with the data. Utilizing the SRM precise fit configurations in SmartPLS facilitates this process.

Authors employed the subsequent metrics for assessing the model in the SmartPLS software:

Values under 0.5 indicate weak reliability; therefore, the indicators with values lower than 0.5 were excluded from the analysis. As a result, this study operates only with the indicators with indicators with Design Confidence above 0.5.

Table 3. **Suggested evaluation for PLS-SEM**

Parameters	Description	Criteria
Estimation of outer model (variables validity)		
Number of iterations	The sum of the changes in the outer weights between two iterations. (Ringle et al., 2020)	5-10
	Maximum number of iterations (Memon et al., 2021)	300
Item reliability	Indicators loadings (IL) (Joseph F. Hair et al., 2019; Ned Kock, 2015; Nunnally, 1978; Widaman, 2012)	>0.70 (highly satisfactory)
		>0.50 <0.70 (acceptable)
		>0.40 <0.50 (week)
Convergent validity (The research variables accurately capture the intended latent constructs, showcasing their validity in convergence.)	Design reliability, a measure of the internal coherence of the scale components (Ken Kwong-Kay Wong, 2019; Nunnally, 1978) – (CR)	>0.80 (Peter, 1979) (satisfactory)
		>0.70 <0.80 (acceptable)
		>0.60 <0.70 (Exploratory study acceptable range is 0.60 to 0.70)
	The average variance extracted (AVE)	>0.5 (Bagozzi et al., 1988)
		AVE >0.5 and CR <0.6 (Fornell et al., 1981)
Discriminant validity	Fornell and Larcker (F&L) , in SmartPLS - Divergent validity heterotrait: monotrait ratios (HTMT) (Joe Hair et al., 2017; Henseler et al., 2015)	Confidence ranges should not include a figure of 1; values beneath 0.85 for theoretically distinct constructs and under 0.90 for analogous constructs.
Structural model (Inner model)		
Coefficient of determination	The preferred number is greater than one (W. W. Chin, 1998; Ringle et al., 2020) – R2	0.67 (substantial)
		0.33 (average)
		0.19 (weak)
Standardized path coefficients	Identify the importance and the confidence intervals – (β)	from −1 to +1.
Effect size	The effect size measures the strength of association between two variables in a population - f2	0.35 (strong effects)
		0.15 (moderate)
		0.02 (weak)
Variance inflation factor	An indicator of the degree of multicollinearity of the data (VIF)	VIF < 3.3 (J. F. Jr. Hair et al., 2010; Joe F. Hair et al., 2011; Petter et al., 2007)
Final model evaluation		
Fit Measures	Standardized Root Mean Square Residual (SRMR) - This metric represents the difference between the actual correlation and what the model predicts for the correlation matrix. Therefore, it aids in assessing the model's fit by examining the mean magnitude of differences between observed and predicted correlations. (Henseler et al., 2015)	<0.08

Source: Developed by authors based on the (Olegs Cernisevs et al., 2023; Popova & Zagulova, 2022a)

4. Results

The research presents the compiled catalog of common threats and susceptibilities within the payment industry. These lists were the result of collaboration with risk experts from the sample companies.

Credit institutions, such as banks, remit funds to the government as security for the deposits they collect from clients. Should the bank face insolvency, these secured funds are utilized by the government to refund the clients. Therefore, only the fluidity of bank resources influences capital adequacy.(van Greuning et al., 2020)

Electronic money establishments or payment institutions, commonly referred to as financial entities, must allocate and protect client funds. In instances of insolvency, refunds to customers are made from these designated accounts. (Brener, 2019; Greenacre et al., 2014; Khalilzadeh et al., 2020; Polasik et al., 2020)

Enterprises listed in the second payment directive and companies that trade cryptocurrency assets (Cernisevs et al., 2019; Polasik et al., 2020) are still subject to capital adequacy risks even though they are not legally obliged to separate customer funds. (Cernisevs, 2021; Fantazzini et al., 2021)

Although there are variances in risk types and their management methods, the goal of capital adequacy remains consistent across all business categories. The authors suggest that the processes of risk management might be analogous, given that all forms of businesses adopt the same criteria for evaluating capital adequacy risk.

The participants emphasize that every other criterion (risk categories) is relevant across all corporations, enabling the assessment of corporate risks through the consistent lists of threats and vulnerabilities, as well as criteria for impact and likelihood of occurrence.

In the preliminary characterization of threats and vulnerabilities, their efficacy in addressing all risk categories was evaluated. The conclusive compilation of threats is presented in Table 1 of Appendix A, while the ultimate roster of vulnerabilities can be found in Table 2 of Appendix A.

The interviewees filled out questionnaires that gauged the likelihood and impact of threats and vulnerabilities. The appraisals provided by the interview participants are presented in Table 3 of Appendix A for threat impact and in Table 4 of Appendix A for threat likelihood. A similar approach is followed for vulnerabilities, with their impact detailed in Table 5 of Appendix A and likelihood documented in Table 6 of Appendix A.

After evaluating the risk linked to each encountered risk according to the established methodology, the authors computed the mean count for each risk category and respondent. The conclusive outcomes are documented in Table 7 within Appendix A. These results were utilized as the foundational dataset for the PLS-SEM analysis conducted using SmartPLS.

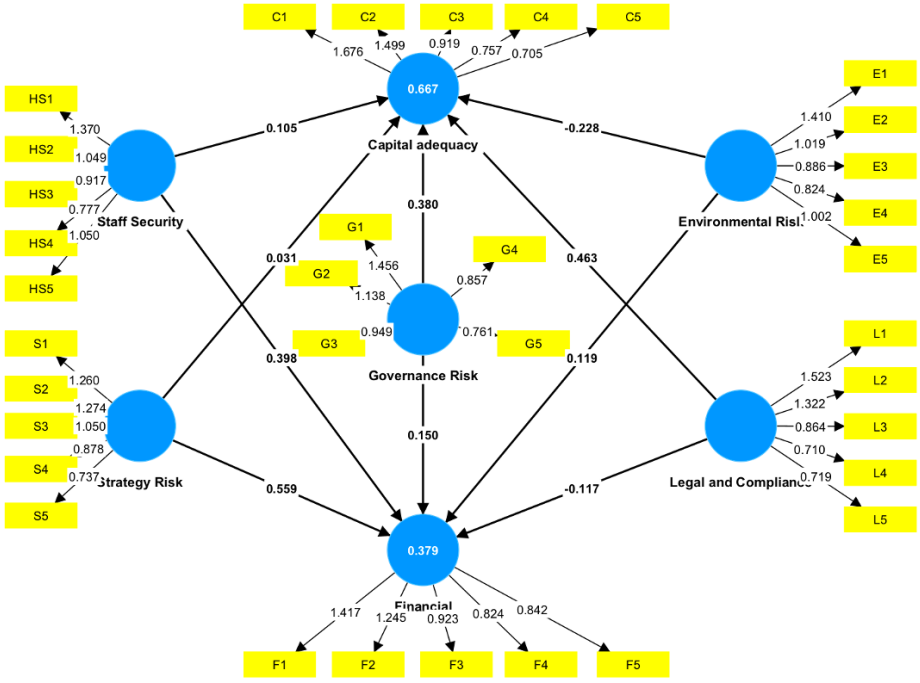
4.1. Estimation of Outer Model

The model constructed with employment of SmartPLS software utilizes the connections identified on the basis of hypotheses put forward in this research. Employing PLS-SEM within SmartPLS 4.0 led to the initial selection of latent variable indicators with loadings greater than 0.60, as this threshold is suitable for exploratory investigations (refer to Table 7). All latent variable values above 0.60 have been incorporated into the model.

Since each variable's loading weight was higher than 0.6, all of them were considered.

Composite Reliability (CR) and AVE used were used to assess the outer model, namely, they were used as construct validity indicators; they met all the specified criteria (refer to Table 3, detailed in Table 4). Each construct exhibited strong dependability and internal consistency. With average variance extracted values exceeding 1.007 and composite reliability surpassing 0.992, it is evident that the variables in question effectively capture the intended latent constructs for measurement.

Figure 1. **Structural Framework Depicting Relationships among Various Types of Risk**



Source: created by the authors with the employment of SmartPLS 4.0 software

Table 4. **Quantitative data**

Constructs	CR	AVE	Composite Reliability (rho_a)
Environmental/External Risk	0.988	0.956	1.007
Health and Safety Risk	0.992	0.968	0.993
Financial Risk	0.970	0.894	0.981
Legal/ Compliance Risk	0.964	0.871	1.005
Strategic Risk	0.989	0.958	0.994
Governance Risk	0.983	0.935	0.994
Capital adequacy Risk	0.986	0.947	0.988

Source: created by the authors utilizing PLS-SEM within SmartPLS 4.0

In the estimation of the outer model, evaluating discriminant validity becomes crucial as it identifies differences between constructs within the model. Within PLS-SEM, assessing discriminant validity often involves two widely employed methods: the Fornell-Larcker measure and the Heterotrait-Monotrait ratio (HTMT) of correlations.

The Fornell-Larcker method is widely used to assess the diagnostic validity of PLS-SEM, although it is sometimes considered less robust, more prone to errors, and less effective ((Dijkstra et al., 2015; Joseph Hair et al., 2014). In contrast, the Heterotrait-Monotrait ratio of correlations (HTMT) approach is a more stringent criterion (Joseph Hair et al., 2014). Recognizing the potential exaggerations of the Fornell-Larcker technique in establishing discriminant validity, Hair (Joseph Hair et al., 2014) advocated for the utilization of HTMT (Joe Hair et al., 2017). Nonetheless, when evaluating discriminant validity, it is advisable to account for the context of each estimated model, alongside the level of each researcher's conservatism (Ab Hamid et al., 2017).

The outcomes thoroughly met the Fornell-Larcker standard, revealing that each indicator had the strongest loadings in the initially targeted construct for measurement (refer to Table 5). Every latent

variable fulfilled the HTMT criterion as well (refer to Table 6). This eliminates any possibility of indicating a lack of diagnostic validity.

Table 5. **Fornell–Larcker criterion**

	Capital Adequacy	Environmental/ External Risk	Financial Risk	Governance Risk	Legal/ Compliance Risk	Health and Safety Risk	Strategic Risk
Capital Adequacy	0.973						
Environmental/External Risk	-0.283	0.978					
Financial Risk	0.518	0.022	0.944				
Governance Risk	0.755	-0.273	0.328	0.967			
Legal/ Compliance Risk	0.714	-0.054	0.164	0.677	0.933		
Health and Safety Risk	-0.342	0.611	0.136	-0.277	-0.412	0.984	
Strategic Risk	0.477	-0.313	0.532	0.543	0.411	-0.284	0.979

Source: created by the authors utilizing PLS-SEM within SmartPLS 4.0

Table 6. **HTMT requirement**

	Capital Adequacy	Environmental/External Risk	Financial Risk	Governance Risk	Legal/ Compliance Risk	Health and Safety Risk	Strategic Risk
Capital Adequacy							
Environmental/External Risk	0.279						
Financial Risk	0.483	0.055					
Governance Risk	0.756	0.269	0.291				
Legal/ Compliance Risk	0.699	0.097	0.199	0.671			
Health and Safety Risk	0.346	0.607	0.160	0.278	0.414		
Strategic Risk	0.475	0.310	0.520	0.551	0.411	0.286	

Source: created by the authors utilizing PLS-SEM within SmartPLS 4.0

The cross-loading indications signify the flawless discriminant validity of the factors.

The variance inflation factor (VIF) in regression analysis can be used to demonstrate the level of multicollinearity. Multicollinearity is measured for the multiple regression models and it appeared when several independent variables show high correlation rate. Values of the variance inflation factor (VIF) are used for assessment of multicollinearity (see Table 8); according to the offered criteria, this indicator's value ideally remains below 3.3 (J. F. Jr. Hair et al., 2010; Joe F. Hair et al., 2011; Petter et al., 2007) The estimations for this model show the values of VIF at the level not higher than 2.685. Consequently, it seems that multicollinearity doesn't raise significant concerns.

Table 7. **Inner model multicollinearity measurements (VIF)**

	Capital Adequacy	Finance
Environmental/External Risk	2.161	2.161
Capital Adequacy		
Governance Risk	2.499	2.499
Finance		
Legal/ Compliance Risk	2.685	2.685
Health and Safety Risk	2.265	2.265
Strategic Risk	1.497	1.497

Source: created by the authors utilizing PLS-SEM within SmartPLS 4.0

4.2 Assessment of the Internal Model (Structural Framework) and Hypothesis Validation

The effect size (f^2), standardized path coefficients (β), and coefficient of determination (R^2) of the inner model are used to describe the connections between the latent variables. Seven of the allowed ten iterations were finished before the study was called off. (W. Chin et al., 2020; Joe Hair et al., 2017)

As stated earlier, the model was initially assessed based on the linkages outlined in the model's framework (refer to Figure 1).

As indicated in Table 8, the latent variables within the model elucidated that around 66.7% of diverse risk types impact Capital Adequacy Risk, and 36.9% influence Financial Risk. These relatively high R^2 values signify that the authors have identified pivotal factors impacting the model's target variables, namely "Capital Adequacy Risk" and "Financial Risk."

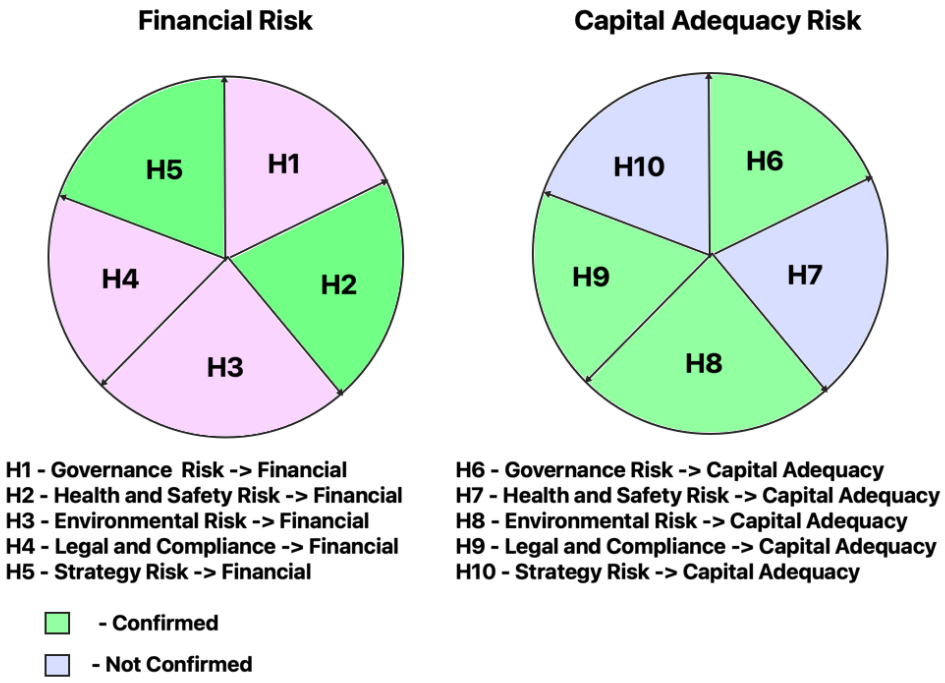
Table 8. **Direct impacts**.

Risk group	β	f^2	STDEV	2.5%	97.5%
Environmental Risk -> Capital adequacy	-0.185	0.048	0.380	-0.930	0.559
Environmental Risk -> Financial	0.074	0.004	0.573	-1.049	1.197
Governance Risk -> Capital adequacy	0.401	0.194	0.233	-0.056	0.858
Governance Risk -> Financial	0.150	0.015	0.345	-0.526	0.827
Legal and Compliance -> Capital adequacy	0.449	0.226	0.301	-0.142	1.039
Legal and Compliance -> Financial	-0.058	0.002	0.419	-0.879	0.764
Staff Security -> Capital adequacy	0.079	0.008	0.376	-0.659	0.817
Staff Security -> Financial	0.272	0.053	0.524	-0.757	1.300
Strategy Risk -> Capital adequacy	0.040	0.003	0.233	-0.416	0.496
Strategy Risk -> Financial	0.574	0.357	0.326	-0.065	1.214

Source: created by the authors utilizing PLS-SEM within SmartPLS 4.0

Concerning the precise associations between risks and other variables, only five out of ten hypotheses were verified. Furthermore, it was found that Environmental Risk has the smallest overall influence ($\beta = 0.574 \pm 0.674$), whereas Strategy Risk exerts the most substantial overall impact on Financial Risk ($\beta = 0.074 \pm 0.427$). The outcomes of hypothesis testing, as presented in Table 8, are succinctly summarized in Figure 2.

Figure 2. **Outcome of Hypothesis Testing**



Source: created by the authors utilizing PLS-SEM within SmartPLS 4.0.

4.3 Comprehensive Model Evaluation

An incomplete model evaluation prevents PLS-SEM research from being completed. However, this estimate didn't work as well as expected. The standardized root means squared residual (SRMR) result was 0.091, but 0.080 is the required number. Although the difference is not significant, it is still important to consider the results of this study.

Based on these observations, it can be inferred that the objective has been achieved and the inquiry has been effectively executed, along with a discerning recognition of its constraints and prospective avenues for additional exploration. Consequently, within the discussion segment, we will delve into potential prospects, considering the interplay between distinct categories of compliance risks and financial as well as capital adequacy risks.

5 Discussion

This study meets the new approach of the ECB and the urgent necessity of companies operating in the financial industry on selection of KPIs beyond the traditional ones. According to this new approach the financial institutions are in high need of indicators, demonstrating the company performance on the basis risk assessment.

In the realm of financial institutions, the assessment and management of risks play a crucial role in ensuring sustainability and success. There are studies devoted to the investigation of risks. For example, (Cernisevs et al., 2023) analyzed the risk associated with the internal processes of financial institutions. Among others, the study investigates the relationship between human resource risks and two key indicators: financial risk and capital adequacy risk. The results of the assessment indicate that

human resource risks do not have a direct influence on financial risk or capital adequacy risk. This implies that factors related to personnel management, such as employee turnover or training deficiencies, do not directly impact these specific financial metrics. However, it is important to note that this conclusion does not diminish the overall significance of effective human resource management for the success of financial institutions. Human capital remains a valuable asset, impacting various aspects of organizational performance.

Contrary to the findings of Cernisevs et al., 2023 on human resource risks, this study reveals that health and safety risks exert an influence on financial risk and capital adequacy risk. This suggests that compliance with legal requirements pertaining to employee health and safety significantly impacts a company's KPIs. Including health and safety risks as a determinant of financial metrics underscores the multidimensional nature of risk assessment within financial institutions. It highlights the importance of considering non-financial factors that can indirectly affect financial performance.

Another factor, which should be considered is the trends of sustainability applied to businesses in all sectors of economy. The European countries are in different stages in their way to sustainable performance (Popova et al., 2021) , but they move in the same direction to sustainable future, and the role of financial institution in this area is very significant and important (Yip et al., 2018). Unfortunately, according to Jeucken, M., & Bouma, J. J. (Marcel Jeucken et al., 2017) the conventional financial institutions are behind other businesses in the way of sustainability, and it is necessary to rethink the business models adopted by financial sector (Atul Subbiah et al., 2016). The KPIs based on risk assessment is a good way to sustainability.

The analysis demonstrates that KPIs related to risks have a substantial influence on financial metrics. This raises questions about the adequacy of traditionally used KPIs in capturing all relevant aspects of financial performance. Despite the evidence indicating the need for additional KPIs to measure financial metrics comprehensively, some scholars advocate using traditional indicators exclusively. This suggests a gap between current research insights and prevailing practices in the field.

The findings of this study hold important implications for financial institutions and the broader academic community. It emphasizes the need for a more holistic approach to KPIs, considering not only financial risks but also human resource risks and compliance with legal requirements. Future research could delve deeper into identifying specific KPIs that effectively capture the influence of various risk factors on financial metrics. Additionally, investigating the interplay between different types of risks and their cumulative impact on financial performance would provide a more comprehensive understanding of the dynamics involved.

This underscores the importance of considering non-financial factors and legal compliance in assessing and managing risk within financial institutions. The study also raises questions about the adequacy of traditional KPIs and advocates for including additional indicators to capture the multidimensional nature of financial performance.

5.1 Research Limitations Overall Model Assessment

The study drew data from five distinct Fintech enterprises. It is foreseeable that analogous influential risks related to financial and capital adequacy risks will be encountered by various other types of Fintech firms, contingent upon their magnitude, degree of digital integration, and customer service approaches. Nonetheless, the authors did not account for these variables, which could potentially be a constraint of this study.

Another constraint emerges from the selection of factors that formed the model construct. Despite the authors' attempt to encompass all conceivable indicators, there remains room to broaden the array of utilized indicators, introduce supplementary factors, or adopt alternative methods of data analysis.

Sampling investigations also entail survey inaccuracies, particularly coverage and sampling errors. It's highly likely that distinctions will exist between the sample and the broader population. Without an extensive randomized study, outcomes from single-group research might lack representativeness. In such scenarios, conclusions from various sample studies carried out by different researchers could be deemed more comprehensive.

It's crucial to underscore the categories of risks examined in this study, as they placed constraints on the interpretative scope of the model. As the mentioned risk categories encompass both internal and external procedures, the authors decided that each risk category should embody compliance processes. This decision might be perceived as limiting the study's range.

6 Conclusions

The new tendencies in development of financial sector require the financial institutions to change the traditional way of business organization. They must consider the sustainability issues in their activities, which presupposes great attention to risk indicators. At the same time, according to the ECB, the risk indicators should form the basis for the KPIs beyond the traditional area, reflected by traditionally used KPIs. Therefore, the authors of this study consider the issue of selecting KPIs of various types of financial institutions based on risk indicators.

In order to create a new approach to choosing Key Performance Indicators, the authors examined the company's key risk indicators as well as the relationships between those indicators. The demands for digitizing a company's management processes were put forward by digitalizing the financial services industry, or Fintech, by selecting appropriate KPIs based on observations of the business events defined by the risk parametrizations.

The preliminary study identified the model's components and indicators. For this reason, the authors contacted five different types of financial and fintech firms operating in different countries in the European Union, which allowed the conclusion that various types of financial institutions around Europe have similar dependencies. The final list of risk elements was compiled with the assistance of the risk specialists from these businesses and organized within the questionnaires. The model's data source was the risk component evaluations based on the aforementioned surveys.

In this study, a model representing the company's compliance function was built based on different risk types. The authors considered the effect of the following risk categories on finances and capital adequacy: governance risk, health and safety risk, environmental/external risk, legal/compliance risk, and strategic risk. The model confirmed the relationship between the compliance procedures and such risks as the capital adequacy risk and the financial risk. The authors make the assumption that the company's financial KPIs are linked to the risk of financial and capital adequacy. The software SmartPLS 4.0's PLS-SEM was used to conduct the research.

This study determined the critical factors affecting KPIs based on financial and capital sufficiency risk.

All departments of Fintech businesses are involved in this process as stakeholders. The outcomes can be a foundation for initiatives that aim to automate performance results.

This study is one of the first steps in creating the scientific basis for determining the KPIs for financial institutions of different types. Future researchers may enhance the threats and vulnerabilities risk elements framework typical for other non-payments-based FinTechs. This research may be used as the base for the development of the AI-based KPI selection and evaluation technics for the automated systems of companies' governance decision formulation based on the selected and evaluated KPIs.

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