An integrative visual multifactor analysis of the UK payments system stakeholders' strategic reports

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Abstract

Strategic reports are used by public companies as an information source to identify organizational priorities, established in this paper as strategic factors from a Resource-based View and Dynamic Capability View. Through an initial factor keyword coding, we use a dictionary-based text analysis to detect the specific factors mentioned in the companies' strategic reports.

Using a systems thinking approach, payments system stakeholders are defined: Acquirers, Banks, Merchant/Retailers, Payment networks, and Regulators. The identified factors are classified, clustered, and visualised using a bespoke framework to understand the stakeholders' strategic alignment, in terms of operational resilience, and environmental, social, and economic sustainability.

Keywords: strategic reports, dictionary-based text analysis, systemigrams, clustering

Introduction

Strategic reports, or 10-K annual reports, are used by public companies to inform shareholders, investors, stakeholders, regulators, and society of their strategic plans. These plans alter the strategic fit among a firm's goals and its resources, or capabilities, based on changing market situations (Law, 2016; SEC, 2021). The reports' first section, the business section, provides a broad overview of a company's operations and plans. It establishes a narrative –a content source –to analyse in terms of structure, readability, and information disclosure (SEC, 2021).

Using a Resource–Based View (RBV) and Dynamic Capability-based View (DCV) approach, our aim is to develop a method to identify, extract, classify, cluster and visualise organizational factors, encompassing resources and capabilities, from the business section of the organizations' reports (Barney, 1991; Teece, Pisano and Shuen, 1997) in order to determine their operational resilience and sustainability. The method can help to understand an organization's factor alignment to different prerogatives such as competitive advantage, sustainability, risk appetite, or operational resilience (Weerawardena and Mavondo, 2011; Lee and Hong, 2016; Morgan, Miočević and Herhausen, 2019; Leo, 2020).

Previous authors have interrogated strategic reports' textual data to perform content analysis in relation to their ability to predict companies' market performance, considering it an important, and complementary, quantitative analysis method (Balakrishnan, Qiu and Srinivasan, 2010; Mishra, Ewing and Pitt, 2020). In this research, a dictionary of factors is developed to query the strategic reports using an inductive approach to define the factors from the reports' common words and phrases.

This paper applies the dictionary-based text analysis technique to identify and extract diverse strategic factors mentioned by payments system organizational stakeholders (Figure 1), namely banks, payment networks, acquirers, retailers, and regulators, in their 2019 10-K annual reports.
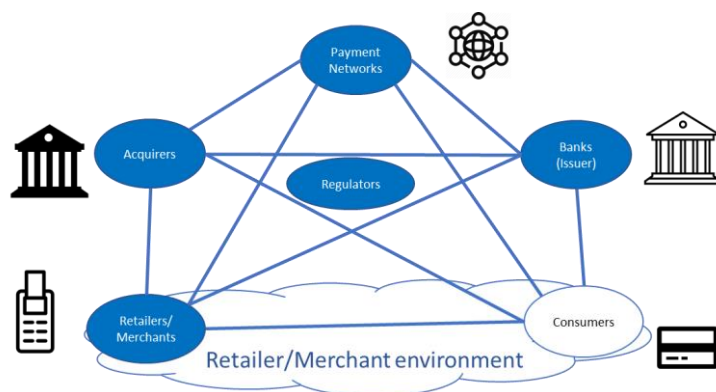

Figure 1 - The payments system environment

We then categorize and cluster the strategic factors to visualize common and specific groups of factors among stakeholders. We include the financial, physical, human, and organisational taxa proposed by Barney (1991), by categorising the resources or factors, using the PESTEL classification (Kolios and Read, 2013) for the specific stakeholders mentioned in the 10-K reports' sections. Finally, we summarise the results using systemigrams, a visual technique, with the help of a strategic decision framework (Lafley and Martin, 2013).

To the best of our knowledge, exploiting such a RBV/DCV-PESTEL-systemigram approach is novel in the interrogation of 10-K reports. While others have considered capabilities in their content analysis of other sectors, they have tended to focus on one discipline or industry, such as marketing excellence (Morgan, Miočević and Herhausen, 2019), customer value proposition (Mishra, Ewing and Pitt, 2020), manufacturing firms' operations servitization (Lee and Hong, 2016), and banks' operations resilience (Leo, 2020).

Our dictionary-based text analysis technique contributes to the stream of content analysis factor multi-categorization techniques, in particular, assessing some of the reproducibility, stability, reliability, and accuracy content analysis limitations related with the technique's subjectivity (Balakrishnan, Qiu and Srinivasan, 2010).

Our results are compared to reports from industry analysts, who wish to understand and document market trends, and regulators, who wish to ensure compliance with laws and standards, to show identified factors' differences (Accenture, 2019; BIS, 2019; World Bank, 2019; Cox *et al.*, 2019; IMF, 2019; McIntyre, 2019; PwC, 2019; Steemis, 2019; UK Finance, 2019; Oliver Wyman, 2020; Vives, 2020). Our method, and the analysts' and regulators' reports, share the common intention of informing banks' shareholders and potential investors of their strategic activities. Although using different wording, they share most identified factors, specifically in the technological and political-related categories.

Background

A strategic plan describes how a firm will adapt to take advantage of market opportunities in its constantly changing environment in order to maintain strategic fit with the firm's goals and capabilities (Law, 2016). The contents of 10-K reports are regulated by the U.S. SEC, in cooperation with the U.K, where companies with 500+ shareholders and $10 million+ in assets should submit their 10-K reports within 60 to 90 days of their fiscal year-end (Li, 2010; Lee and Hong, 2016; FCA, 2019). In terms of content analysis, they are also scrutinized by a wide range of industry stakeholders, who focus on forward-looking statements to predict organisational and overall market performance (Jizi *et al.*, 2014; Karapandza, 2016).

Researchers have shown clearer strategic reports are produced by better performing firms, although there are mixed opinions in terms of readability, informative capacity, and credibility (Li, 2010; Srinivasan, Srinivasan and Marques, 2015; Gandhi, Loughran and McDonald, 2019).

In terms of standardization, the regulated format and structure of the 10-K report might be considered restrictive and generic (Abraham and Cox, 2007; SEC, 2021). The content standardization of reports' sections can be either too narrow or too broad, depending on the organizations' size and other characteristics (Tate, Ellram and Kirchoff, 2010). The reports are commonly divided into sections targeting different stakeholders, for example, customers, employees and regulators. Notwithstanding these limitations, companies and regulators have worked to improve the content displayed in strategic reports in an effort to: prevent future market crisis, facilitate information and knowledge sharing initiatives (Cummins and Bawden, 2010), and satisfy economic and corporate social responsibility objectives (Jizi *et al.*, 2014).

Content analysis is based on concept or word identification, through stem words or synonyms, and word categorization. Categorization can be an inductive or deductive,

depending on the availability of previous works. A theoretically grounded deductive approach investigates the different established categories from the related literature. For example, banking-specific sentiment analysis has been based on a standardized dictionary called Diction (Davis, Piger and Sedor, 2012; Khadjeh Nassirtoussi *et al.*, 2014; Katsafados *et al.*, 2021). An inductive, or explorative, approach develops categories based on the content's coding (Seuring and Gold, 2012).

Dictionary-based text analysis, also known as word list text analysis, has seen increasing use (Loughran and McDonald, 2015). This method automates the process of content analysis by searching for key phrases or words within a corpus of similar documents, to establish theoretical artifacts or constructs using a deductive or inductive approach. The key phrase or word discovery can be done manually or automatically.

Method

A detailed extraction and analysis of the selected stakeholders' strategic factors is proposed through a dictionary-based text analysis of Section 1 of their 10-K strategic reports. The stakeholders were selected based on their significant market share and influential value. The selected stakeholders cover almost 80% of the UK market (Norrestad, 2019). The proposed method is outlined in Figure 2, following the automated text analysis stages proposed by Humphreys and Wang (2018).
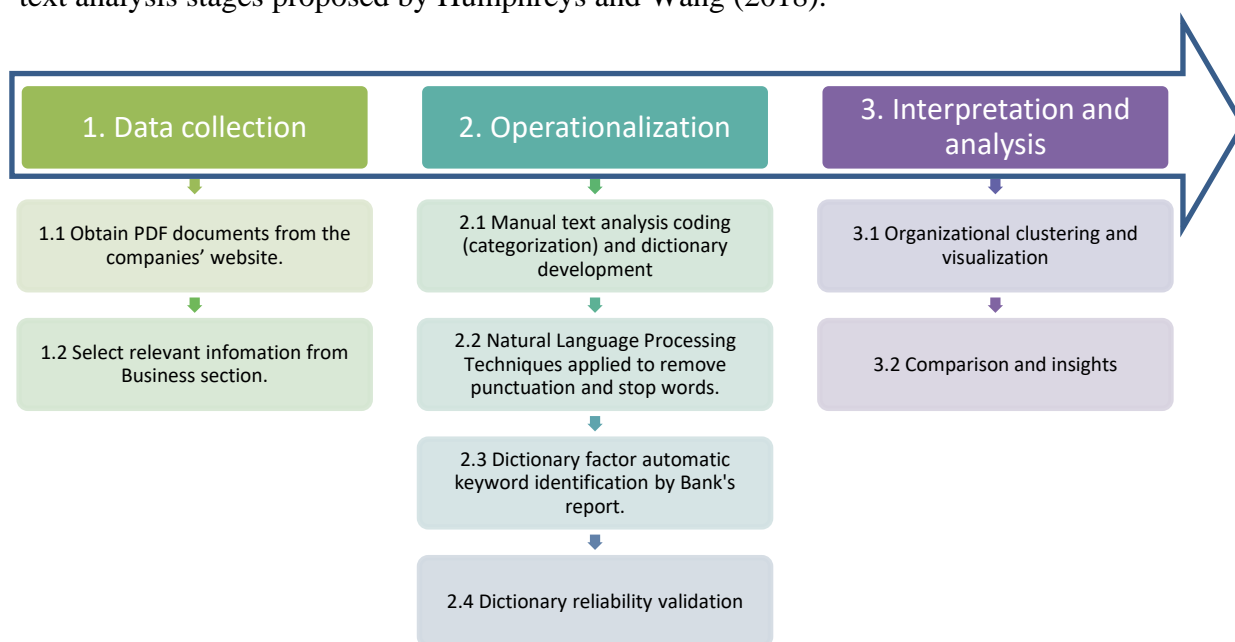

Figure 2 - Method activity overview, based on Humphreys and Wang (2018)

The *data collection* stage consisted of two steps. First, the strategic report PDF files was downloaded from the companies' websites. Then, each bank's relevant strategic report's business section was separated as a text file.

The *operationalization* stage used manual coding through the NVivo software. The strategic factors were identified based on whether they mentioned any organizational resources, capabilities used, or plans to be developed. The strategic factors were classified using a PESTEL categorization obtained from previous research (Kolios and Read, 2013).

To evaluate the factors' macro-environment or external alignment, a grounded-theory classification is exploited based on the organizations' stakeholders mentioned in the report's business section:

- Customers: Any person or group with purchasing needs.
- Colleagues or Employees: People working at the company and receiving a salary and benefits.
- Suppliers and partners: Companies or people that provide services to the company as a separate legal entity.
- Merchants: Commercial companies [Small and Medium Enterprises (SMEs) and large retailers] offering products for sale.
- Regulators:
  - Government: Mainly interested in economic development policies.
  - Policymakers: Those that establish the governance principles and business rules.

The PESTEL framework from Kolios & Read (2013) was adopted to categorize the factors according to the strategic factors' external or macro-environment function or, as extensively as possible:

- Political and Organisational (e.g. Organizations' interests)
- Economic and Financial (e.g. GDP/ income)
- Socio-Cultural and Demographic (e.g. Cultural beliefs)
- Technological and Methodological (e.g. R&D, Technological readiness)
- Environmental and Societal (e.g. Sustainability and impact on the community)
- Legal and Ethical (e.g. Privacy issues)

Given the scope of expanding the analysis to a larger sample, the strategic factors dictionary was developed by identifying common and complete, not stemmed, keywords or key phrases contained in each of the factors' codes identified (Jun and Cai, 2001). The report's text was pre-processed using Natural Processing Language (NPL) commands in the open-source software "R" that extract punctuation marks (i.e. points, commas, exclamation marks) and stop words (i.e. articles, common verbs, and pronouns), leaving just the relevant words and phrases to be analysed (Humphreys and Wang, 2018).

As a next step, the dictionary was implemented in the documents' corpus, the strategic reports. "R" automated the NPL techniques and the dictionary implementation, as previous researchers had used it successfully (Welbers, Van Atteveldt and Benoit, 2017). The result presents as a matrix with the factor presence and frequency in each of the stakeholders' strategic reports.

Finally, for the *interpretation and analysis* activity, the factors were clustered according to their appearance in each of the stakeholders' reports. These organizational clusters were identified with factors that were common among all stakeholders, common among a subset of stakeholders, or specific to a stakeholder. Common factors were grouped to visualize them easier; for example, some initiatives talking about app development capabilities were grouped together. Systemigrams of the payment system common factors' were developed to differentiate objectives, strategies, capabilities and target markets aligned with operational resilience and sustainability (Lafley and Martin, 2013). Key insights can be obtained from the visual cluster analysis, as discussed in the Results section. For the results' validation, a factors' comparison with reports from banking industry analysts was performed (Accenture, 2019; BIS, 2019; World Bank,

2019; Cox *et al.*, 2019; IMF, 2019; McIntyre, 2019; PwC, 2019; Steemis, 2019; UK Finance, 2019; Oliver Wyman, 2020; Vives, 2020).

Results

The analysis is performed by looking at the factors outlined in the strategic reports of the UK's biggest market shareholders in terms of *Banks* (Barclays, HSBC, Lloyds, RBS, and Santander), *Acquirers* (FIS, Fiserv, GPN, and US Bancorp), *Payment Networks* (American Express, Discover, Mastercard, and Visa), *Merchants/Retailers* (Amazon, Morrisons, Sainsburys, Tesco, and Walmart-ASDA) and *Regulators* (Bank of England, FCA, HM Treasury, PRA and UK Finance) (Norrestad, 2019).

After the manual coding text analysis, the theoretical dictionary development process identified 518 factors. After the dictionary's matrix factor frequency was obtained, an accuracy, or reliability, analysis was performed in the NVivo software to manually verify each factor's meaning was aligned to the strategic reports' text (Humphreys and Wang, 2018).

From the total 518 factors, 190 factors were detected (37%) to be shared by at least one of the selected organizations from each stakeholder and only 27 were common to all stakeholders and organizations (5%). In the PESTEL categorization (Figure 3), Technological and Methodological (32%) is the most frequent, followed by Political and Organizational (23%) and Environmental and Societal (12%). In terms of stakeholder's categorization, 33% of the factors are focused on Customers, 20% on Investors and Board, and 20% on Regulators, Governments, and Policy Makers.
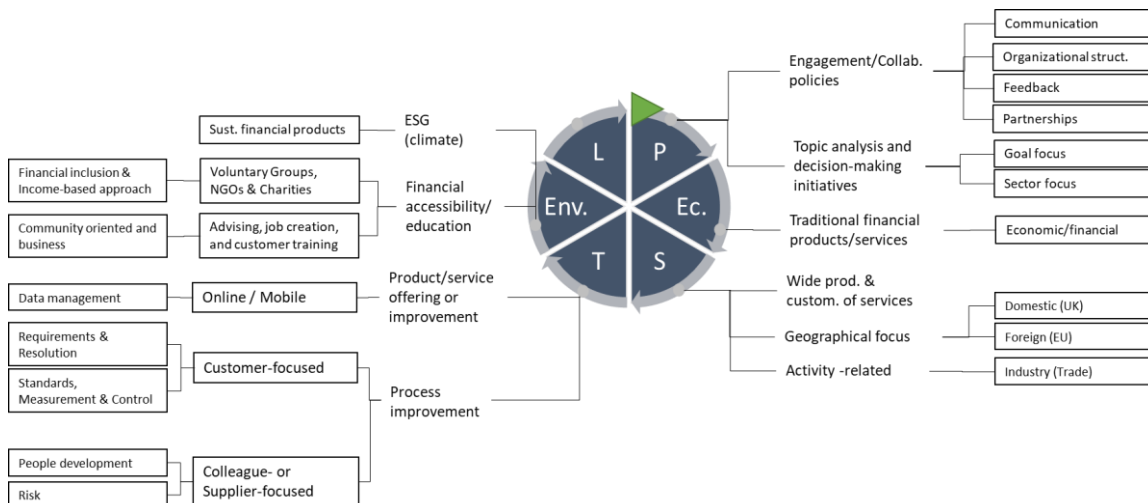

Figure 3 - PESTEL factors common to all stakeholders (14%)

The strategic factors' organizational clustering shows 14% shared by all stakeholders, 12% shared by four stakeholders, 16% by three stakeholders, 23% by two stakeholders and 35% stakeholder specific. In the shared by four-three-two stakeholders tier, the largest clusters are Acquirer and Payment Networks with 5%, Acquirers-Banks-Merchants-Payment Networks and Acquirers-Merchants-Payment Networks with 2%, most of the factors in the Technological and Methodological category. By comparing all the shared factors, without tiering them, the three most similar are Acquirers and Payment Networks with 13% of the identified factors, while Regulators and Acquirers the least with 8%. This shared factors' analysis helps identify competing capabilities and resources, as established in the RBV theory (Warren, 2005).

The foregoing analysis allows the development of an integrative prose, a precursor to the establishment of a systemigram visual model (Figure 4) -

"All **Payments System stakeholders** have seen increased *Regulator collaboration and compliance requirements, related with Information disclosure & Industry standards)* and *Customer feedback.* The two main areas are on *ESG initiatives (sustainable products or services)*, related to *Climate & health focused initiatives* and *Community financial education* with an *Income-based focus*. As well as, in *Credit, debt or lending services*, that has to do with the *Trade sector*, being a capital-intensive market, and specifically related to *Retail* with a focus on *SMEs*.

The stakeholders have developed *Strategic business plans*, especially on *Technology and Innovation*, and *Colleagues' development*, as well as an increased use of *Partnerships and Alliances* in line with Coopetition practices.

The *Technology and innovation strategies* have focused on *IT infrastructure development*, encompassing *Data management and privacy practices*, *Cyber security*, and *Online/Mobile platform development*, including *Social media* and *Fintech* investments, mainly related with *Machine Learning and Artificial Intelligence*, and *Cloud* capabilities. Related to the *Colleagues' development strategy*, all stakeholders have focused on *Colleague mentoring/coaching support*, highlighting *Leadership*, and *Digital learning, training & skilling*.

These factors or capabilities will support better decision making with the help of *Performance management systems*, overlooking *goals definition, measurement/monitoring, reviewing/assessment* through *Data and Statistics*, such as *Surveys*, and *Reports*, as well as the help of an *Auditing* capability. Another important resource mentioned that is integrated with the *Performance management systems,* is the *Enterprise Risk Management Framework*, with a specific focus on *Climate change risks & Risk Weighted Assets* reduction.

Other basic support organizational capabilities are the *Communication capabilities*, such as *Events, Statements, Union's partnership communication and negotiations*, and *Meetings*, as well as *Group work capabilities*, such as *Committees, Membership, Teams, Groups, Forums* and Centres, which tend to focus on specific goal development, such as the Task Force on Climate-related Financial Disclosures.

The stakeholders main geographical target is in the *UK market*, but also having *Europe* and *other International regions* as a priority. Mainly, incentivizing customers through *Rewards programs*, and *Social media marketing* to reach *Economic profitability, Social & Environmental sustainability,* and *Organizational resilience.*"
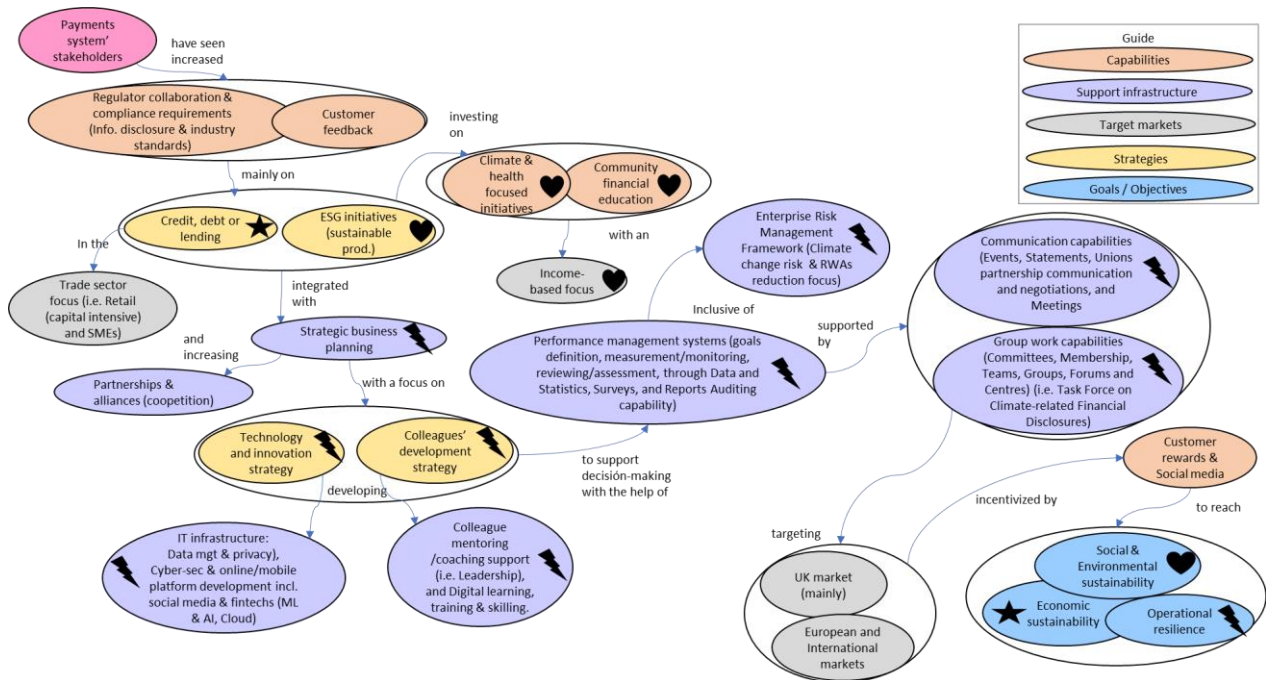
Figure 4 - Payments System's systemigram graphic

Discussion

As there is no standard dictionary available for the payment system's specific strategic factors, a dictionary had to created inductively (Jun and Cai, 2001; Humphreys and Wang, 2018). This dictionary-based coding required the manual coding of each strategic factor, reducing selected passages from the strategic reports into specific keywords or phrases to reduce coder's subjectivity. For example, the strategic initiatives related to a *digital environment*, would contain the word "digital" or other synonyms. Nonetheless, there is still some subjectivity, as the dictionary must be verified and extended to become more standardized and robust. The coding stability and accuracy was addressed by repeating the operationalization, interpretation, and analysis processes with a three-month temporal gap by the same coder. These processes were not performed by another coder and it remains as a potential methodological improvement (Seuring and Gold, 2012). The coder also performed a reliability check to make sure each factor appeared in the text with the expected meaning, ensuring that the factors' meanings matched in 70% or more of the identified frequencies (Smith and Taffler, 2000).

The results were compared to financial sector's analysts' reports. These reports give an industry overview, summarise current opportunities and risks, and predict future trends. The reports focus mainly on operational resilience but also mention economic, social, and environmental sustainability. Typical examples include reports by consulting and advisory companies, and national or international regulatory bodies. Of specific interest are the 2019 reports by consulting companies such as Accenture/Gartner, PWC, Oliver Wyman (OW), and regulatory bodies such as the World Bank (WB), the International Monetary Fund (IMF), the Bank of International Settlements (BIS), the Organisation for Economic Co-operation and Development (OECD), UK Finance, and Bank of England (BoE) (Accenture, 2019; BIS, 2019; World Bank, 2019; Cox *et al.*, 2019; IMF, 2019; McIntyre, 2019; PwC, 2019; Steemis, 2019; UK Finance, 2019; Oliver Wyman, 2020; Vives, 2020). Comparison showed that the factors identified covered more than 90% of the factor's mentioned by the 10 selected analyst reports. The factors that were not identified are related with the *Technological and Methodological (T)* and *Political and*

Organizational (P) PESTEL categories. In the Technological and Methodological category, technologies such as 5G, edge computing, Bring-Your-Own-Device (BYOD), robotics, the Internet-of-Things (IoT), and Quick Record (QR) payments were not spotted with the method developed. In addition, in the Political and Organizational category referenced, the implementation of control rooms, the focus on the gig or sharing economy, and a 24/7 availability of services were not identified.

About 17% of the factors identified from the analyst's reports used different words and phrases but referred to the same factor. As an example, cryptocurrencies and digital tokens were used to refer to the same technology (Vives, 2020). This comparison can enrich the dictionary for later use, as this method identifies just the factors from available published information, including identified risks. Unidentified risks could be also interesting to research by cross-referencing industry reports. In comparison to the industry reports, our method adds value from the factor's categorization, clustering, and visualization, which can be made easily traceable or reversed engineered, bringing an industry overview with respect to established objectives.

The method still has limitations that may be addressed by extension. For example, enhancing the reproducibility, stability, accuracy, and reliability by 1) refining the factor's description, as well as the keyword or key phrase choice to reduce any overlaps, and/or 2) automating the learning of factors' keywords by using a term frequency-inverse document frequency (tf-idf) algorithm, which accounts for the total number of word occurrences, scaled by its importance across all documents, or specifying the keyword structure (Humphreys and Wang, 2018). Another way of improving the accuracy of meaning is by separating the document sections that refer to specific stakeholders, such as those targeting customers, colleagues and ESG, among others.

Conclusions

The dictionary-based text analysis might be simplistic, but it is traceable, easy to reproduce, and can give a general overview of important organizational initiatives or strategic factors, in contrast to analysts´ reports. Overall, payments system stakeholders are focusing on customer-oriented product and service improvement and digitization, costumer and colleague education and skilling, performance, or risk management initiatives to target operational resilience. As well as enhancing collaboration along their network, and developing ESG focused initiatives, such as climate change and local community development.

This is a useful approach to analyse larger sets of information. Although, determining all the payments system interacting factors is difficult, our proposed method is a reasonable first attempt to understand the strategic factors or capabilities stakeholders are working upon. Furthermore, this method identified industry-wide initiatives while identifying unique market propositions. Such information will be of benefit to regulators and analysts as well as shareholders and investors. The method developed contributes to the literature related to industry, or field, capabilities gap analysis, by taking a systems thinking strategic visual approach with systemigrams that cluster initiatives at a certain level of detail (i.e. system, stakeholder, organization) and communicate strategic intent in an easy and understandable way.

In terms of future research opportunities, the developed method can be tested by extension to more organizations that participate in the payments system industry and publish reports. The analysis undertaken here is initially a qualitative comparison and could be extended to look for correlations between the factors identified and stakeholders'

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financial performance indicators, temporal/evolutionary effects (Humphreys and Wang, 2018; Morgan, Miočević and Herhausen, 2019; Herhausen *et al.*, 2020; Homburg, Theel and Hohenberg, 2020), and correlation and predictive evaluation of the strategic factors identified with organizational performance indicators (Davydov and Sihvonen, 2021). The reliability of our research could be improved by including additional coders' validation and the results could be verified by using surveys or interviews with industry participants.

Acknowledgements

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