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The Sustainable Value of Open Banking: Insights from an Open Data Lens

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Abstract

Open Banking has emerged as an initiative which has the potential to disrupt the retail banking sector by improving competition and innovation in the industry. But is Open Banking capable of producing sustainable value? This is a question that is relevant for all open initiatives given the transfer of value from incumbents to newer entities with the aim of improving innovation and customer benefit. It is particularly relevant for Open Banking at this stage of its maturity. This study undertakes a global analysis (across 17 regions) on Open Banking through the lens of Open Data. We contribute to the open data lens and provide insights into the potential success of Open Banking. Specifically, we synthesise a definition of Open Banking, we highlight that Open Banking is not entirely 'open' compared to other open initiatives, and we discuss how Open Banking may provide sustainable value for consumers, Fintech's, and traditional banks.

1. Introduction

Within IS research, openness as a phenomenon has gained an increasing focus in connection with fundamental organizational operations such as: software development, innovation, competitive advantage, and digital transformation [1]. Indeed, such has been the interest in openness it has expanded beyond research boundaries and now become mainstream as a source of innovation and disruption for industries such as housing [2], government [3], and transport [4]. Focusing on Open Banking, this paper explores the value that openness has brought to the financial industry.

While there are many working definitions of Open Banking in the industry, there has been little effort to understand what it actually is within academic circles. For instance, the most succinct definition to-date comes from Currie, Gozman [5] who refer to Open Banking as a shift from an old institutional regime of opacity to an increased openness and transparency. While quite vague this definition has led to the acknowledgement that Open Banking challenges many of the institutionalized assumptions around the aspects of information asymmetry [6]. This in particular highlights the central nature of openness around data and information and a point of focus when exploring the Open Banking, which has received little or no interest from academics [6], partly because many of the relevant interactions are taking place outside the view of researchers [7].

The retail banking industry has traditionally been referred to as a 'walled garden' environment, exclusively reserved for an elite cohort of established banks [8], however the emergence of Open Banking seeks to disrupt the status quo by putting control in the hands of the consumer, giving them ownership of their financial data and allowing them to share this data with TTP's who are offering new products and services [9, 10]. Open Banking is an emerging initiative which has the potential to disrupt retail banking globally, improving competition and innovation in established markets [11], increasing financial inclusion in developing economies [12], and potentially extending to other industries in the future [13].

With a wide range of definitions used in practice, we sought to develop a synthesized definition. To achieve this, we focused on the definitions proposed by two stakeholder groups; the nine prominent UK banks who were mandated to implement Open Banking initiatives, along with three advanced regulatory standards (see Table 1). These were selected from the sources we gathered for our global analysis as they represented the leading banks and regulatory standards available today. The purpose of this approach was twofold; first, we provide a clear definition for Open Banking, and second, we highlight how different

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stakeholders are interpreting the potential of Open Banking.

Therefore, we propose the following definition for Open Banking:

An initiative which facilitates the secure sharing of account data with licensed third parties through Application Programming Interfaces (APIs), empowering customers with ownership of their own data. The initiative aims to increase competition in retail banking by developing innovative products and services which will bring increased value to customers.

In the definitions outlined by the banks, data sharing was mentioned in every case highlighting the centrality of open data to the implementation of Open Banking. The second most common aspect was the potential to collaborate with licensed. The need for licensing would support the sensitivity of banking data and need be mindful of security at all times, which is also mentioned frequently in the banks' definitions.

Aspects such as new products and services, increased customer value, and customer data ownership (and consent) are also frequently mentioned. However, there are only two mentions of data standards (API development), which would suggest that while data is central the need to create standardized access has yet to be fully considered. Analysing the definitions set out by the regulatory bodies, it is apparent that their focus is on increasing competition in the market with all three highlighting the topic. However, it is interesting to note that this was not mentioned by the banks. What is also striking is the lack of explicit focus on data standards and customer data ownership in their definitions. Given the role of the regulators in digital governance it would be assumed the focus on these aspects of Open Banking would be a top priority.

This poses the question of the sustainability of open banking. Is open banking creating sustainable value for key stakeholders? To examine these questions, this study leverages the work of Jetzek, Avital [2], which presents a model to explain how open data generates sustainable value.

The remainder of this paper is structured as follows; first we introduce the open data research lens which we use to analyse Open Banking. Second, we detail our methodological approach and the industry resources which were included in the study. Third, we discuss Open Banking in the context of each element of the framework developed by [2]. Finally, we discuss our findings and the contributions made to both research and practice.

Table 1: Definition of Open Banking

		Sharing Account data	Licensed Collaboration (TTP's)	Security	New Products and Services	Customer Data Ownership	Increased Customer Value	Data Standards	Increased Competition
Banks	AIB	✓	✓			✓			
	Barclays	✓	✓	✓	✓	✓		✓	
	Lloyds	✓			✓	✓	✓		
	Nationwide	✓	✓	✓	✓		✓	✓	
	RBS	✓	✓	✓			✓		
	Bank of Ireland	✓	✓	✓		✓	✓		
	HSBC UK	✓	✓	✓	✓		✓		
	Santander	✓	✓	✓		✓			
	Danske	✓	✓		✓				
	Count:	**9**	**8**	**6**	**5**	**5**	**5**	**2**	**0**
Regulation	CMA			✓	✓				✓
	PSD2				✓		✓		✓
	CDR	✓	✓	✓			✓		✓
	Count:	**1**	**1**	**2**	**2**	**0**	**2**	**0**	**3**
Total Count:		**10**	**9**	**8**	**7**	**5**	**7**	**2**	**3**

2. Open Data as a Research Lens

Open data is data which has been made available to public users, including citizens, businesses, researchers, civil servants, and others, to be freely used, modified, and shared for any purpose. Intellectual property rights are outright relinquished or reduced to a minimum, and often such open data is made available through open APIs in machine-readable formats [2, 4, 14-16]. Indeed, open data is an appropriate lens to for the analysis of Open Banking as both initiatives look to create value by taking what was once proprietary data and sharing it with external parties to facilitate new products and services. Illustrated in Figure 1, Jetzek, Avital [2]

framework, developed through Open Government Data highlights a number of mechanisms on how sustainable value is created, a key aspect for the longevity of the initiative, just as it is for Open Banking. As a result, this study seeks to apply the structure of this model to Open Banking. The enablers listed on the left of the model include Digital Governance, Openness of Data, and Digital Infrastructure. These enablers facilitate the development of digital assets in the form of new products and services for retail banking, which in turn generate sustainable value.

Adapted to focus on Open Banking these concepts are outlined as follows:

Digital Governance: digital leadership and regulatory data and privacy protection frameworks, which together reflect the governance aspect of an Open Banking initiative.

Openness of Data: the degree to which bank account data is available, affordable, and sharable, published in a usable and interoperable format, and made both discoverable and accessible.

Digital Infrastructure: a collection of technological and human components that contribute to the functioning of an Open Banking platform.

Digital Assets: includes (i) Shared Digital Content, which is banking data that has been processed to become digestible information and then shared to external parties, and (ii) Digital Products and Services, which is the combination of open and proprietary resources to produce differentiated products and services.

Sustainable Value: a contribution that simultaneously delivers both short- and long-term economic, social, and environmental benefits.

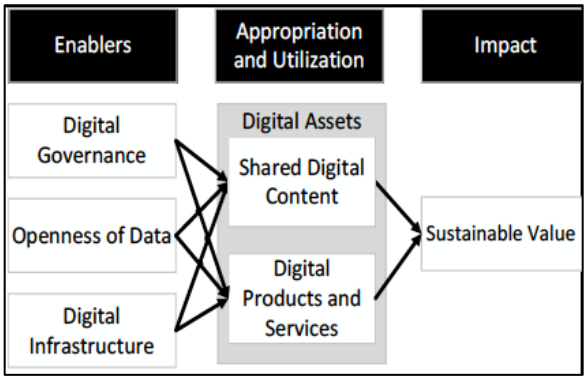


Figure1.Research Model(adapted from [2])

3. Methodology

Given the term Open Banking is a term mainly used in practice [6], this study primarily focused on documents produced by key industry players: regulatory bodies, banks, licensed technology third parties (TTP's), and industry research/consultancy organizations. Collated over a period of 5 months, a total of 81 documents/sources were analysed, focusing on 17 regulatory jurisdictions, across multiple geographic regions and both developed and developing economies (Australia, Brazil, Canada, China, EU, Hong Kong, India, Indonesia, Japan, Malaysia, Mexico, New Zealand, Nigeria, Singapore, Thailand, UK, and USA). Incorporating Jetzek et al.'s [2] Open Data model as a theoretical frame, each of the 81 documents were analysed by utilising the open data concepts of: (i) digital governance, (ii) openness, (iii) digital infrastructure,

(iv) digital assets, and (v) sustainable value. The results were then analysed across the 17 regulatory jurisdictions. Once completed the coded data was further interrogated by the research team through systematic questioning and triangulated interpretations to generate more consistent results. Furthermore, to reduce the impact of analysis bias the principle of dialogical reasoning was followed to highlight an awareness of possible contradictions and improve the separation between any predeterminations and our actual findings [17]. The result of this analysis provides a global perspective, the first of its kind on Open Banking. Furthermore, having operationalized the Jetzek et al. [2] model of open data for banking, the concepts in the model are applied to the sources collected providing a theoretical underpinning to the analysis. These results can be generalised to other open trends such as Open Energy or Open Telecom.

4. Data Analysis

4.1 Digital Governance

Digital governance includes work structures, organizational behaviours, governance, and the regulatory environment which influences the motivation of individuals and organizations to generate value through data [2]. From our analysis we found the digital governance of Open Banking to be following several approaches and at various stages of maturity across the globe, see Table 2.

We found the UK to have the most mature digital governance for Open Banking, with an established regulatory framework in the CMA Order of 2017 which placed a legal mandate upon the nine largest UK banks and building societies (the CMA9) to make their customers 'personal and business current account banking data available to authorized TTPs through secure APIs [10]. Also, the UK will adopt PSD2 and GDPR as introduced by the EU. In addition to this, in the UK, an Open Banking framework and API standard have been mandated by the Competition and Markets Authority [10]) and will be overseen by a dedicated

body, the OBIE [18]. The aim of the Open Banking Working Group was to determine how data sharing might work in practice. In 2016, the OBWG published a high level framework for sharing banking data and

Table 2. Open Banking Digital Governance Global Landscape

Approach	Region (Regulation or Regulator)	Sources
Established Open Banking Regulation and API Standards	UK (PSD2/GDPR/CMA)	[10, 18]
Established Open Banking Regulation - No API Standards	EU (PSD2/GDPR)	[9, 22]
Actively Developing Open Banking Regulation	Australia (Consumer Data Right (CDR))	[23, 24]
	Mexico (The FinTech Law)	[12]
	Brazil (COMMUNIQUÉ 33,455 Brazil's General Data Protection Law)	[25]
	Canada (Personal Information Protection and Electronic Documents Act (PIPEDA))	[26]
	New Zealand *(PaymentsNZ)*	[11, 12]
	Japan (Japan's Banking Act)	[11, 12, 27, 28]
	India (Data Empowerment and Protection Architecture (DEPA))	[11]
Regulatory Sandbox Approach	Singapore (Monetary Authority of Singapore)	[28-30]
	Hong Kong (Hong Kong Monetary Authority (HKMA))	[11, 30]
	Malaysia (Bank Negara Malaysia (BNM))	[30, 31]
	Indonesia (Bank Sentral Republik (BSR, the central bank))	[30, 32, 33]
	Thailand (Personal Data Protection Act)	[30, 34-36]
Supporting Financial/TTP Regulation	USA (Dodd-Frank Act)	[21, 37, 38]
No Regulation – Market driven	China (None yet – GDPR Equivalent expected)	[39, 40]
	Nigeria *(None)*	[11, 41]

guidelines on how to implement them [18]. These additional structures offer an extra layer of maturity to the governance approach of this region.

The EU differs from the UK in that, while it has established a strong regulatory framework, there is a lack of API standards. The key relevant regulations, include PSD2 and GDPR. PSD2 updates and complements the rules set out in PSD1 and takes new providers of innovative payment services into account. PSD2 opens the payment markets to these new entrants to encourage increases competition and offer greater choice and better prices for consumers. PSD2 outlines two types of regulated Trusted Third Party that will be granted direct access to customer accounts [19], namely Account Information Service Provider (AISP) and Payment Initiation Service Provider (PISP). GDPR came into force across the EU on 25 May 2018. GDPR aims to harmonize data privacy laws within the EU. It applies to all personal data, of which Open Banking data is a subset [19, 20]. However, at present, the EU Open Banking ecosystem can be summarized as being fragmented and lacking agreement on IT and data exchange standards [21].

Most regions fall under the categorization of 'Actively Developing Open Banking Regulation'.

As outlined in Table 2, Australia, Mexico, Brazil, Canada, New Zealand, Japan, and India have all taken significant steps to introduce regulation or develop API standards to support Open Banking. These regions still require a significant amount of work to further mature their digital governance approach. In time this should help realize the full potential of Open Banking in these regions. We found that several Asian countries have adopted a more active approach to the Digital Governance of Open Banking, using Regulatory Sandboxes. Regulatory Sandbox is a regulatory-driven initiative which allows businesses to test innovative products, services, business models delivery mechanism in a live environment. Typically, some regulatory requirements are amended to create a bespoke framework for the implementation [30]. Similar to those actively developing regulation, these regions are still emerging, but they show high potential impact as they continue to mature.

Finally, we found three regions to be especially low in terms of maturity. Open Banking implementation efforts in the US are supported by the Dodd Frank act, which support the sharing of financial account and transaction data. Also, NACHA are looking to develop API standards. However, governance is more complicated considering the state-by-state basis by which laws are set. China is taking a laissez-faire approach to regulation, as is often the case in their FinTech sector, leaving the market to drive implementation standards. Open Banking Nigeria was launched by Open Technology Foundation, to roll out

open APIs and encourage banks and TTP's to adopt open standards for API implementation, however there is no mandated regulation.

In summary, Digital Governance of Open Banking is a dynamic concept. Many regions are actively working on regulation to cater for this initiative and new FinTech's are being established to increase competition in the market and cater for consumer demands. For now, Digital Governance remains fluid with an array of regulatory standards and maturity, along with an expanding banking market.

4.2 Openness of Data

Openness of data is a measure of the extent to which data are available online without technical restrictions to access, link, and stream across systems, provided for free and under an open access license based on a sampling method [42]. In order to get an accurate view of the degree of openness of data, we leverage the characteristics framework put forward by Jetzek, Avital [2] as detailed in Table 3. For many open data repositories, the goal is to curate and publish high-level macro datasets to fulfil the potential need of a wide audience. For Open Banking, the goal is to provide customers better access to their data with the ability to derive further value from it and is largely limited to payment enabled financial account data [11].

Ultimately, this has a knock-on effect on how open the data actually is. Given the sensitive nature of financial data only licensed TTP's can gain access. It is not shareable to the general public but should be open to the individuals who effectively own the data. In addition, the lack of a global Open Banking API standard, is an issue which we will discuss at length under 'Digital Infrastructure', is a major challenge for Open Banking, when compared to the usability of open data through machine-readable APIs. Indeed, those that are published offer relatively restrictive functionality, for example, variable recurring payments were not initially included in Open Banking APIs in the UK as they were not mandated under PSD2 [11].

Table 3: Openness assessment of Open Banking data (Adapted from [2])

Description	Open Data (Housing)	Open Banking
Available: data is widely available to stakeholders outside organizational boundaries.	**High:** Data is available to all users on data.gov.	**Medium**: data is made available but only to Licensed Trusted Third Parties. Furthermore, this assumes the customer has given their permission to share the data.
Affordable: data is affordable and economic barriers are reduced or eliminated.	**High:** Data has been free to access on data.gov since 2009.	**Medium**: there is a cost with becoming Licensed TTP in highly regulated regions. However, the more significant cost will be the charge for the Open Banking service/product applied by the TTP.
Shareable: data is published with open licenses and other legal barriers are reduced.	**High:** Data can be freely used, modified, and shared by anyone for any purpose.	**Low**: in contrast to other open datasets such as Data.gov, Open Banking datasets are designed to be shared to very limited audience, with the goal of creating benefit to the owner of the data (the customer).
Interoperable: data originating from diverse sources are published with standard identifiers.	**High:** The data is published in a standard format making it easy for others to work with.	**Variable**: interoperability is determined by the maturity of digital governance. In the UK, banks are following clear data standards resulting in high interoperability. However, in less mature regions the opposite is true.
Usable: data is accurately, timely, and consistently published in machine-readable formats.	**High:** The data is regularly updated on data.gov and is available in a variety of machine-readable formats depending on the type of data.	**Medium**: given the critical nature of bank account data it is safe to assume it is accurate. However, combining it with other internal sources and publishing in usable formats is not a simple undertaking given the challenges organizations are facing with digital transformations.
Discoverable: data is published centrally and easily discoverable via a web search or linked data.	**High:** The data is easily discoverable at data.gov.	**Low**: the data is only published with a certain number of partners. It is not searchable or discoverable via the web.
Accessible: data is published with multiple, secure access possibilities.	**High:** The data is accessible in several formats with "A variety of physical, electronic and procedural safeguards."	**Medium**: the goal is to publish the data with high secure and transparent access. As mentioned above, for TTP's accessibility will be high, however, the number of instances of high accessibility is low.

Furthermore, as one of the goals is to create added value for customers through TTP's, there is going to be a cost associated with new products and services. Thus, access to the data will not be free. In addition, providing usable data is a significant challenge for multiple banks. Indeed, just like all other organizations, data quality of internal data is a problem [43]. Due to the criticality of datasets like bank account transactional data it may not be such an issue. However, accurate customer data and aggregating customer accounts has proven to be a

challenge. Hence, the barrier to produce usable data is quite high in some cases depends on the quality of the existing data structures within banks and how adept they are at successfully completing digital transformations [44].

We found that Open Banking is not entirely 'open'. Indeed, based off the above evaluation of the openness of data, when compared to Open Housing Data (Table 3) we can conclude that Open Banking scores relatively poorly along all measures of openness. However, our analysis shows that the primary reason for this is the sensitive nature of financial data and subsequent licensing requirements, as well as a lack of standards across different jurisdictions.

4.3 Digital Infrastructure

Digital infrastructure is defined as a collection of technological and human components that contribute to the functioning of an information system, enterprise or economy [2, 45]. Human components relating to Open Banking include the desire for competition or negative sentiment toward incumbents in the retail banking sector, changing consumer expectations in relation to the products and services they receive from banks, the adoption of mobile banking platforms and smartphone penetration, and the number of unbanked adults in the region. The primary technological components necessary for Open Banking include the APIs used for the sharing of data with TTP's, the mobile internet infrastructure available to customers in a region, and the culture of technological innovation in the region. First, the way customers interact with banks and financial institutions is changing. Customers across different regions have varying levels of trust in, or positive sentiment towards, the established banks. For example, in the UK, the CMA Order was initiated due to a lack of competition against the established players in retail banking [10]. A reliance on a small number of large financial institutions was a contributing factor to the global financial crisis of 2008/09.

However, contrary to this, Canada was not effected to the same extent by the economic crisis, and as a result customers are largely content with their established banks, therefore, Open Banking is not garnering the same levels of attention [29].

In the EU and UK, new entrants into the market will need to be authorized as trusted third parties with AISP and PISP licenses to provide these products and services. Authorized third parties, using secure APIs will have the ability to aggregate a consumer's financial products in one place; provide customized insights about an individual's spending behaviour; assist consumers in creating saving habits; and initiate payments with consent from the consumer [46].

The real threat in the eyes of the incumbents are the big technology firms who will be empowered by Open Banking to apply their expertise in data to disrupt the financial sector. A survey conducted by KPMG found that 53 percent of the surveyed banks saw GAFA (Google, Amazon, Facebook, and Apple) as a significant long run threat [47]. These tech giants could insert themselves further between the customer and the underlying bank, a trend we have already seen in payments through the evolution of the Apple and Google pay platforms [8].

Table 4: Components of Digital Infrastructure that support Open Banking

	Component
Human Components	Need for competition/negative sentiment toward established banks
	Customer Expectations
	Smartphone/Mobile Banking Penetration
	Unbanked individuals
Technological Components	API Standards
	Internet Infrastructure
	Culture of Technology/Innovation

Second, customers have come to expect greater transparency, convenience, and speed [21]. A Deloitte study found that user experience, operationalized via an 'easy/quick application process', 'fast decision-making' and the 'convenience of an online platform' were the strongest drivers of consumer borrowing from marketplace lenders, even ahead of 'competitive rates' [19]. For example, N26 is one of Europe's fastest growing digital banks and focuses on creating a superior user experience for their customers. Traditional banks need to compete with these new banking solutions which focus on developing and maintaining strong customer relationships [28].

Third is the level of smartphone penetration in a region as well as the adoption of mobile banking and digital payments. According to a Deloitte study, UK smartphone penetration surpassed 80 percent in 2016 [19]. In China, smartphone penetration is also high and 78 percent of Chinese smartphone users have adopted a mobile banking app [39], making the region high potential for Open Banking adoption. Singapore's customers also have high adoption potential with 67 percent already using mobile banking apps and 88 percent of the digitally active population using two or more TTP services [48]. Hong Kong customers are considered as being of high-potential for Open Banking adoption as they are willing to share their banking data with TTPs [49]. In the US consumers are also considered comfortable sharing their data and transacting online, as there is a culture of convenience in the market. Customers value convenience even when

faced with concerns regarding data privacy and cybersecurity [37].

Fourth, regions with high levels of unbanked adults are in prime position to reap the rewards from adopting Open Banking. For example, it has been reported that Mexico has 42 million unbanked citizens, accounting for 56 percent of the population [11]. However, it is estimated that over 10 million Mexican adults have a mobile phone but not a bank account [50]. As of 2017, the World Bank estimated that 4 percent of the worlds unbanked adult population resided in Nigeria, while 10 percent of these have access to smart phones and the internet. Additionally, roughly half of Indonesia's adults had a bank account in 2017. Indonesia is ASEAN's second-largest economy yet, is the country with the most unbanked individuals [32]. Meanwhile, it has also been shown that Indonesian digitally active banking customers has grown 2.5 times since 2014, with digital banking channels growing twice as fast as other emerging Asian markets [33]. The number of unbanked individuals is less of a driver in developed economies such as the EU, which is why Open Banking in these regions is primarily focused on addressing existing customers increased expectations around the standard of service they receive.

As regards technological components of the digital infrastructure, a key element of the Open Banking initiative is the development of secure APIs to expose bank account data to authorized third parties [11]. The use of APIs will make the process of sharing bank data far more secure compared to screen-scraping approaches which are used to date [11]. From the reviewed APIs and standards, the most notable ones are OBIE in the UK, OBN in Nigeria, PaymentsNZ in New Zealand, and UPI in India. These are characterized as being mature, regularly updated in terms of documentation and functionality and are accompanied by demo environments to enable more rapid implementation. Unfortunately, the global Open Banking API landscape is characterized by fragmented implementation. There is no single solution in the design of such APIs, or a concrete set of rules and guidelines adopted worldwide. This diverse landscape introduces obstacles in implementing unified environments and necessitates the use of aggregation frameworks such as Token.io or the aggregators listed in Open Banking Tracker [51].

In addition to APIs, environmental and infrastructural factors are also required to support the adoption of Open Banking. In Brazil, while consumers are avid users of digital payments and aggregation, with 73 percent of those surveyed saying they would be comfortable using online-only banking services. Unfortunately, significant infrastructural issues could prevent the adoption of Open Banking in the region. Broadband services are poor and may not be enough for services beyond basic digital payments. Only 13 percent of Brazil's population has a broadband internet subscription, and only 43 percent have a smart phone [52].

Other environmental factors may also play a role in the success of Open Banking in certain regions, for example, the regions culture. Despite being reluctant to adopt Open Banking, Canada has a strong innovation environment, with a thriving FinTech industry, strong private investment, good support from government for start-ups, and Toronto is a leading global Tech hub [53]. In Singapore, the financial sector is considered a global hub for innovation. Also, the US financial sector is highly innovative; 141 TTP's received venture capital funding rounds in the last three years; meanwhile, banks and TTP's filed 128 patents in 2017 [37].

4.4 Digital Assets

A digital asset is any piece of digital content, product, or service that holds value through expected future benefits [2]. Digital assets ultimately seek to generate sustainable value for stakeholders in the Open Banking ecosystem. Open Banking creates opportunities for innovative TTP's to leverage customers financial data to create unique products and services. However, in the absence of uniform Open Banking API standards across different regions, these services are at various stages of development and many still implement screen scraping where necessary to accommodate certain customers. As part of our global industry analysis we examined TTP's, licensed with AISP and/or PISP licenses, which are listed in the recently launched Open Banking App Store1.

The store highlight three primary types of Open Banking products and services: (i) Consumer, (ii) Business, and (iii) Open Banking Technical Services. The first category focuses on providing new personal finance produces and services to individual banking consumers. Leveraging the shared content created from account aggregation services customers can view all their accounts across all banks on one interface as well as performing analytics to help identify spending trends and plan for the future [41]. Other services include the likes of micro savings, which allow consumers to easily transfer small amounts from their current accounts to their savings accounts. It is estimated that there are currently nine million account holders with average balances of £7,500 who are currently not earning interest. Open Banking could help consumers earn incremental interest of £400m per annum though micro savings apps [11]. Moneybox's goal is to provide millions of people with the tools they need to save and invest for their future. Given the difficulty of poor credit

choices by customers and banks, credit scoring companies can use account information APIs to produce a fuller picture of a borrower's financial health or compare their historical transactions with an existing credit file. Traditional credit scoring solutions fail to give a true picture of a person's financial capabilities, Open Banking services like Koyo cater for people with limited credit history and shares their relevant data with lenders to get a fairer decision.[1]

Table 5. Open Banking Products and Services

Product/Service Type	Provider (examples)
Consumer	
Personal Finance Tools	Yolt, Moneyhub
Account Aggregator	Cake
Credit file enhancement	Koyo, Canopy, Nomo
Debt advice	Castlight, Tully
Micro Savings	Moneybox
Product Comparison	Lumino
Investment Tools	Lumino, Yolt
Charitable Giving	Sustainably
Business	
Loans/Alternative Lending	Credit Kudos
SME financial management	ClearBooks, Xero
E-commerce payments	Banked, Citizen
Identity Verification	DirectID, OpenWrks
Open Banking Technical Services	
Open Banking as a service	TrueLayer, OpenWrks, Plaid

The second category focuses on businesses. These services extend the functionality of existing financial management software solutions. For example Xero, have built a value chain around time restricted SME's that incorporates automated digital solutions such as payments, reconciliations, reverse factoring, payroll, invoicing, and liquidity forecasting [29]. Finally, the third category focuses on filling any gaps within the Open Banking information supply chain; from the acquisition of customer data to its delivery through the TTP products and services. These TTP's focus more on the back-end providing functionality to integrated into customer facing platforms.

It is noteworthy that these products and services are, for the most part, already offered by incumbent banks, the difference being that Open Banking providers do not rely on the use of insecure screen- scraping methods [19]. Given that the purpose of Open Banking is to improve competition and innovation in retail banking, the Digital Assets listed in Table 5 are not true innovations, they are exploitative rather than explorative [54]. As Open Banking adoption and implementation grows in the coming years, we expect that novel products and services will start to emerge. Open Banking can be viewed as an affordance, as it creates potential for action in retail banking [55], the next step is for this potential to be triggered [56] and actualized [57]. The affordance actualization process will results in creating the conditions for additional affordances, the development of additional IS features, and/or enabling organizational change [55].

4.5 Sustainable Value

Sustainable value is considered to be a contribution that simultaneously delivers both short- and long-term economic, social and environmental benefits [2]. While, Open Banking is still in early stages of development it has made a lot of progress in achieving the goals set out by regulators and banking organizations. The rise of TTP's and the FinTech market has signalled the increasing ability to share bank account data securely with external parties. It also highlights new and increased competitive forces at play with new products and services being created. As a result, the new products and services are just the green shoots of what is possible. Nonetheless, evidence points towards sustainable value being created.

Of course, as illustrated in Table 1, a core objective of Open Banking is to create value for retail banking customers. Emerging products and services, such as those listed in Table 5 provide benefits to customers in the short-term with personalised banking services and increased choice to assist them in saving, investing, and accessing credit. From the analysis we present in this paper, we believe that these offerings will continue to improve in the long-term as Open Banking matures and moves toward 'Open Finance' [11].

Licensed TTPs and FinTech's also stand to gain from Open Banking. The short-term benefits from this stakeholder group is that they can get access to a wealth of customer data which they are primed to capitalise on due to their superior digital agility when compared to incumbent banks [58]. In the long-term, Open Banking creates opportunities for FinTech's to create new business models in developing markets with large numbers of unbanked customers to improve financial inclusion [59].

The value for established banks in the long-term is less clear as they are now mandated to invest in developing an infrastructure to share an asset, for which they may not see any value in return. Their participation

[1] https://www.openbanking.org.uk/app-store/

in open banking initiatives across all jurisdictions suggests that there is value outside of regulatory compliance. However, participation is strongest in those areas with more mature open banking regulation. Current value for incumbents with open banking is the path it may pave for the strategic digital transformation programs they have undertaken in recent years [44]. It may also provide an opportunity to build up strategic partnerships through the ground rules set out by Open Banking regulation. For instance, Barclays and PayPal have partnered to allow customers to view their Barclays and PayPal accounts in one dashboard, as well as potentially extending the Barclays rewards program via PayPal channels [49]. Additionally, banks may look develop Premium APIs offering increased functionality beyond that mandated by regulation to their partners [11]. This may provide sufficient value as banks realize the threat that large data organizations' such as google pose to their underlying digital business model not least their ability to lock their customers in.

5. Conclusion and Contributions

First, this study contributes to IS research by developing a synthesized definition of Open Banking; An initiative which facilitates the secure sharing of account data with licensed third parties through Application Programming Interfaces (APIs), empowering customers with ownership of their own data. The initiative aims to increase competition in retail banking by developing innovative products and services which will bring increased value to customers. This is a necessary and valuable initial step to take in an emerging field. Often in emerging fields it can be difficult to reach consensus around a definition, especially with many different interpretations of the term in practice. This definition improves upon those put forward by practitioners as it is developed by analysing definitions of both incumbent banks and regulators, providing a clear definition while also highlighting how both groups are interpreting Open Banking. This will enable others to question the direction and focus of Open Banking and ultimately assess the success it achieves.

Second, our definition highlighted that both parties had diverging views on the objectives of Open Banking, which motivated the research question; is open banking creating sustainable value for key stakeholders? We answered this research question by adopting the model developed by Jetzek, Avital [2], and in Section 4.5 above, we explicitly discuss both the short and long-term benefits that Open Banking presents for customers, FinTechs, and established banks.

Third, this research has positioned Open Banking against open data, leveraging the work of Jetzek, Avital [2] to highlight the components of Open Banking, where there may be opportunities to improve efficiencies, and how Open Banking creates sustainable value for different stakeholders. This research largely supports the relationship between digital governance, openness of data, and digital infrastructure in enabling the development of digital assets. Digital governance of Open Banking is still maturing, and many regions are actively developing regulations. As for the digital infrastructure, lack of global standards and maturity currently inhibits the development of digital assets. Finally, as regards openness of data, we found that Open Banking scores poorly for this component, therefore, posing the question, can Open Banking be more open? Given the sensitive nature of financial data compared to other open initiatives and the lack of standards across jurisdictions, it may be difficult for Open Banking to improve this measure. Overall, we found Jetzek, Avital [2] to be a suitable exploratory lens to analyse Open Banking, however these novel aspects of financial data compared to other open data initiatives limit the applicability. Future research may look to explore this in more detail and extend the Jetzek, Avital [2] model.

We highlighted that the enablers of Open Banking, at present, lack maturity and therefore inhibit the generation of value. To develop a more comprehensive understanding of how to generate value from Open Banking, future research could analyse Open Banking through alternative theoretical lens' such as resource-based view [1], Actor-Network theory [60], or affordances and actualization [61] as have been successfully applied in other domains.

As for practical contributions of this research, Open Banking has potential to disrupt the current retail banking ecosystem, and is considered to be the first step in the movement towards 'Open Finance' [11]. This research is timely in its attempt to provide clarity to practitioners regarding its potential impact. Also, it is apparent that the concepts pertaining to data and availing of additional new products and services can be generalized and applied to a plethora of other industries whereby customers, and the industry itself would benefit from moving from their as-is state in which customer data is held within the walled gardens of the incumbent players, to a more customer-centric model which empowers the individual consumer to share their data with third- parties in an effort to avail of new, innovative products and services. Australia already has plans to develop this concept for Open Energy and Open Telecom in the coming years, to create "Economy- wide open data" [62]. The sharing of data in these industries will increase competition between providers and make it easier for customers to switch between providers.

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