

A Blockchain Technology Model for Detecting and Preventing Superannuation Fraud

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Abstract

The Australian government introduced a superannuation scheme to provide workers with savings for retirement. Superannuation is one of the most valuable assets of the majority of Australians. The scheme requires employers to set aside superannuation funds to provide their employees with a dignified retirement. However, some employers failed to make the required contributions to their employees' superannuation funds. Moreover, some did not make correct payments or debit the incorrect funds in violation of legal obligations. To prevent fraud and to ensure both employers and their workers have access to employer contributions information, a robust superannuation system is essential. This paper aims to assess the suitability of blockchain technology for addressing the challenges of detecting and preventing superannuation fraud. Prior studies suggest that blockchain technology has not yet been used in the superannuation sector. The proposed research will involve reviewing the literature on disruptive technologies to determine the most compatible ones for these tasks. The results of the research will contribute to the disruptive technology models literature and support the superannuation industry by improving accuracy in superannuation contribution and budgeting.

Keywords

Unpaid superannuation, superannuation fraud, Disruptive technologies, Blockchain technology, Transparency.

1. Introduction

Pension systems are based on the idea that they reduce income during the working years and provide retirement benefits for retirees (Koomen and Wicht 2022). Superannuation, sometimes known as "super" in Australia, is a scheme for retirement savings (Australian Taxation Office 2022). Employers are required to make contributions on behalf of their employees to a superannuation fund, which is subsequently invested in a variety of assets to increase over time. In addition to the age pension supplied by the government, the superannuation system is designed to give Australians retirement income. To encourage people to save more money for retirement, the government offers tax advantages as

well as the option for employees to make voluntary contributions to their superannuation funds. Superannuation funds in Australia are regulated by the Australian Prudential Regulation Authority (APRA) and the Australian Securities and Investments Commission (ASIC) (Australian Securities and Investments Commission 2021). When people reach retirement age, they can either take a lump sum payment or a regular income stream out of their superannuation funds. In Australia, the Superannuation Guarantee (SG) was introduced in 1992 to increase retirement savings in place of a pay boost at a rate of 3% (Industry Super Australia 2019). The Australian Taxation Office (ATO) provides the most updated information on Superannuation, and it shows that from 01st July 2023, the SG rate is 11% on employees' wages and the employers are required to pay this amount to employees' super funds at least once a quarter (Australian Taxation Office 2023). This rate is expected to be increased up to 12% by July 2025 (Avkiran 2018). Small Business Superannuation Clearing House (SBSCH), a free facility provided by the federal government through ATO, allows small businesses to pay superannuation while processing payments (Australian Taxation Office 2021).

However, many employees in Australia have not received their employer superannuation payments. Workers making less than \$450 per month, many of whom are women, were not eligible for the SG before the 2021 Federal Budget (Broomhill et al. 2021). This opened the door for some to avoid paying their contributions into their employees' superannuation accounts. According to Bernie Dean, CEO of Industry Super Australia, employees lose almost \$6 billion in unpaid superannuation annually, and the government needs to do more to ensure that businesses follow contribution laws (Australasian Business Intelligence 2020). Mr. James O'Halloran, the ATO Deputy Commissioner in charge of Superannuation, once stated that the ATO doesn't have a reliable method yet (Senate Economic References Committee 2017). While the Australian government makes significant efforts to protect workers superannuation fraud is a concern.

There has been a study growth in the use of technology to detect and prevent fraud. Almost every discipline, including the accounting profession is adopting disruptive information technologies such as Artificial Intelligence and blockchain technology. A literature review on the adoption of disruptive technologies in the accounting profession suggests that it is still in the early stages of adoption and there is scope for using new technologies for detecting and preventing fraud. The superannuation contribution process can be automated by adopting disruptive technologies where all related internal and external authorities can access information related to the superannuation contribution transactions. Therefore, this study aims to review the popular disruptive technology models specifically for the superannuation contribution tasks in accounting. The objectives of this research would be identifying and mapping the popular disruptive technologies models used in different sectors and determining whether they can be adopted for existing superannuation contribution tasks. Accordingly, the following research questions are presented.

RQ1. What disruptive technologies are being used for productivity gains and process efficiency?

RQ2. Can blockchain technology be used to detect and prevent superannuation fraud?

The proposed research will be significant and reasonable in terms of automating existing superannuation contributions where there is no existing practical application of disruptive technologies. Furthermore, this will be a timely topic with the popularity of automation and adopting disruptive technologies in various industries. Moreover, the scope of the study will be useful and practicable in addressing the problems of superannuation contribution. The disruptive technology model presented in this study would apply to all Australian organisations.

This paper is organised into four sections. Section two presents a literature review on the use of disruptive technologies in the accounting profession. Section three outlines the research methodology adopted for the proposed study. Section four summarised the key aspects of the proposed study, its limitations and future directions.

2. Literature Review

The literature review attempts to investigate the state of the art of the most popular disruptive technologies and the level of their penetration in the accounting profession while identifying any research gaps where these technologies have still not been adopted. Furthermore, this study investigates the research on the application of disruptive technologies not only in the superannuation sector but also in other disciplines.

2.1 A Review of Disruptive Technologies

New technologies can resolve most of the problems in the society (Schuelke and Beth 2018). This study reviewed the most popular disruptive technologies blockchain and AI. The general definition of disruptive technology is "a new

technology that completely changes the way things are done” (Cambridge Dictionary). It is defined as “a technology that’s introduced into the market that has lower cost and greater benefits”. It can be noted that disruptive technology has brought business models and industries to a rapid technological advancement (PWC, n.d.).

Artificial Intelligence (AI) is one of the most popular disruptive technologies. Industry experts from BlackLine, an American enterprise software company explain that AI software has become more sophisticated in the finance and accounting sectors. A study into the AI use in organisations indicates that several chief financial officers (CFO) in more than 150 US companies are already using AI in their organisations. Whereas, an equal number of CFOs are investigating the possible use of AI. BCN, a Banking and Credit news predicts that the use of AI will be more common in many sectors in the next few years (M2 Banking and Credit News 2018).

When discussing disruptive technologies, the blockchain concept cannot be ignored. blockchain technology and distributed ledgers attract many industries due to the benefits they offer (Nofer et al. 2017). Blockchain technology is a peer-to-peer (P2P) distributed system (Douaihy 2018). The concept of blockchain is presenting ledgers of transactions that are recorded as blocks of data in a blockchain network. The transactions that are created in the blockchain are permanent, verified and encrypted.

Well-known crypto-currency Bitcoin also records transactions on an electronic ledger. Cryptocurrencies are digital currencies that have no tangible existence but record currency transactions as digital signals (Smith and Kumar 2018). These digital ledgers cannot be altered (Drescher 2018). While examining popular disruptive technologies, the next innovation that follows blockchain is Hyperledger. Hyperledger is an open-source project that came out of the Linux Foundation which is a leading open technology developer. Open source is a software licensing model which allows users to use it for free. The purpose of creating Hyperledger was to help advance cross-industry blockchain technologies. This is a shared ledger that has smart contract, privacy and trust features. Baset (2018) explains the development and functions of Hyperledger along with the type of industries where it can be used.

2.2 Applications of blockchain technology

Disruptive technologies are adopted in a variety of other fields to increase productivity and efficiency. The business environment is one of the areas that is highly impacted by disruptive technologies. Walsh, Kirchoff and Newbert (2002) developed a ‘Disruptive technology innovation model’ to identify the level of success in competitive markets after adopting disruptive technologies. A survey conducted by the authors shows that new firms have more advantages of commercialising disruptive technologies in marketing strategy (Walsh et al. 2002). Furthermore, there are licensed apps and programs that are used in different sectors, and they highlight there was a systematic problem with the “Yandex. Taxi” smartphone application regarding its legal regulations, technological independence and public trust (Limba et al. 2019).

Healthcare is another important sector where they are experimenting with and experiencing the influences of disruptive technologies. Blockchain is one of the popular disruptive technologies and this decentralised system has been adopted in multiple tasks in healthcare. Matthias (2016) explains that the decentralised system of blockchain is an advantage when many parties need access to the same information. Furthermore, the author explains the system’s ability to store data in a safe environment. The author also describes that blockchain technology can be designed to monitor the production process of drugs by referring to the technology used in Bitcoin transactions (Mettler 2016). Matthias concludes that disruptive technologies play an important role in the healthcare sector in providing access to medical professionals to look up information on patients, medications as well as medical histories of patients which are recorded and saved on a common platform. Disruptive technologies also strengthen the tourism industry. The hospitality payment system uses a decentralised system to avoid fraud and identity theft in e-tourism. The introduced Blockchain-Enabled Smart Tourism and Hospitality Management (BloHosT) system enables smart payments and higher Return on Investment (ROI) in the tourism sector (Bodkhe, et al. 2019). It seems that the features and mechanisms of disruptive technologies are applied in a range of processes in many sectors. Scholars recognise the importance of adopting disruptive technologies and the possible practical applications in different sectors.

2.3 Blockchain technology for Superannuation payments

Ghasemia et al. (2011) explain that there was a significant development in the use of information technology and automation for auditing, fund transfers and a few other accounting functions. Information technology has computerised the auditing profession by introducing audit software packages. Companies were able to connect to

banks through Electronic Funds Transfer (EFT) which enabled companies to make payments and receive funds electronically. Kaaniche, Nesrine, and Maryline (2018) propose an auditing system that focuses on accuracy and privacy. The authors introduce a new Blockchain-based Data Usage Auditing System called BDUA. They explain that blockchain is particularly suitable for data accounting and auditing features. They mention that this proposed system ensures a controlled, privacy-preserving exchange of distributed data, which is a set of authorised auditing entities that can conduct an accurate auditing project, relying on registered blockchain transactions. Wang and Kogan (2018) explain that the convergence of accounting and blockchain technology reduces the unessential manual handling, enhances the pace of transaction settlement and prevents financial reporting fraud. An empirical study by Rîndaşu, (2019) shows that aspiring and professional accountants and auditors in Romania are becoming familiar with these emerging technologies, but they are not fully mastering them. Although the practical outcomes are yet to be seen, prior studies explain that innovative technologies can impact auditing methods in the superannuation sector. When focusing on payroll tasks, in 2022, Musa and Thomas (2022) pointed out that blockchain technology has the capability to reduce fraud and improve payroll system efficiency. However, there aren't many recommendations for using blockchain in superannuation payments. It is important to know the reason for not having many blockchain-based payroll applications, even though payroll has been completely computerised.

Priest (2019) states that blockchain has been introduced in various sectors to minimise fraud. The article focuses on superannuation fraud in relation to the identity of users. Priest suggests implementing a digital signature system to minimize superannuation fraud where users have a public and a private key that can be used to digitally sign transactions, smart contracts and other kinds of records.

This review attempts to identify the research gaps in relation to the practical application of blockchain technology to detect and prevent superannuation fraud. The study finds that disruptive technologies can be adopted in any industry. The literature review also justifies the significance of the proposed research as there are several areas in the superannuation sector where disruptive technologies have not been widely used and their adoption would contribute to improving process efficiencies and preventing fraud.

3. Research Methodology

Research is an investigation that is carried out methodically by looking at sources and literature in order to validate information and draw conclusions. Research can be divided into four categories: descriptive, analytical, basic, and applied. Finding solutions to a problem in a society, industry, or organisation is the goal of applied research (Kothari 2004). The proposed research work on blockchain technologies for superannuation contribution will be applied research which will be identifying or designing the most compatible disruptive technology models that can be adopted to solve specifically identified gaps in superannuation contribution. This type of research will be helpful since it contributes to the resolution of real-world issues, but its results are typically restricted to circumstances (Dudovskiy 2011). The proposed research approach, design and expected contributions are discussed in sections 3.1, 3.2 and 3.3.

3.1. Research Approach

The research approach provides steps for the process of general assumptions towards comprehensive data collection, analysis, and interpretation methods (Chetty 2016). The research approach of this research work focuses on experimental design and simulation. Experimental design allows to study the behaviour of one or more parameters in the presence of one or more controlled parameters. The term control parameter in experimental design refers to a parameter that is not of main consideration and hence represents an external or third component whose effect is to be controlled or eliminated (Salkind 2012). In our research project, the controlled parameters are the superannuation contribution and budgeting tasks for which we design the disruptive technology models. While the developed models will be tested through simulations for their security and delay, these tasks remain unchanged.

As is usually the case with scientific processes, both experimental and practical measurement methods depend on objective evaluation. Realism presumes that even if there is no such thing as final truth or knowledge, a more profound reality is discoverable (Hawkins 2014).

There are both advantages and disadvantages to using experimental design. The advantages are the ability to control variables, the ability to determine the relationship between cause and effect and the ability to get better results. However, there are disadvantages such as the possibility of human errors during the process and the possibility of creating artificial situations by controlling variables (Miller 2015). Since we use simulations and the programs are

debugged, there are no opportunities for human errors. Also, as mentioned above, the control parameters stay unchanged during this experimental work and hence, there is no room for creating artificial situations.

One of the processes that will be used in this research will be analogy. Analogy is a creative method of introducing a relational framework that is typically applied in one discipline to another discipline (Dedre 1983). However, when adopting analogy, there are conditions such as analogy being based on maximum similarities to the important characteristics, the correlation between unknown and known signs being provable, comparison not resulting in the claim of absolute similarities between the analogue and the object being studied and the analysis of similar features being complemented by the analysis of all known discrepancies between the analogue and the object being studied (Victorsson 2018).

The benefit of using analogy will be the possibility of finding the most suitable structure to solve the research problem. Therefore, the effort to make a brand-new structure will be reduced. However, identifying the best model for the specific task will be time consuming since there is a range of disruptive technology models that are being used in other industries. As a result, there will be many sources that need to be referred to, searched and read before making decisions. In addition, if the related features are random in the comparative cases, the analogy may turn out to be incorrect (Banks et al. 2010).

3.2. Research Design

The purpose of a research design is to guarantee that the information obtained allows the researcher to resolve the research problem as effectively as possible. This research focuses on designing the most compatible disruptive technology that can be used in the practical application of superannuation contribution and testing it via simulations. Based on the review, this study intends to develop a blockchain model for achieving transparency in superannuation payments. This will help detect and prevent superannuation fraud. As part of the study, disruptive technologies and their use in different sectors were reviewed. According to the literature review, there is a significant usage of disruptive technologies in many industries such as finance, auditing, hospitality, health and business sectors. Considering the benefits of blockchain technology, this study aims to develop a blockchain-based solution to prevent superannuation fraud.

In our experimental research methodology and research methods, simulation plays a key role. A simulation is a process of imitating tasks of a system or a procedure that reflects its operation throughout a period (Banks et al. 2010). Simulation is connected to the experimental method, and it can provide access for researchers to procedures that cannot be observed directly in a secured and controlled environment. During a simulation, different types of data can be gathered which can be used for the research work and objectives (Lamé 2020).

A process diagram will be developed to illustrate the steps involved in the superannuation payments and the failings of the current superannuation payment system including transparency and data exchange among parties involved in the transactions for superannuation payments. To address the shortfall in the current process, a blockchain-based approach will be presented. Following is a process diagram for superannuation payments (Figure 1).

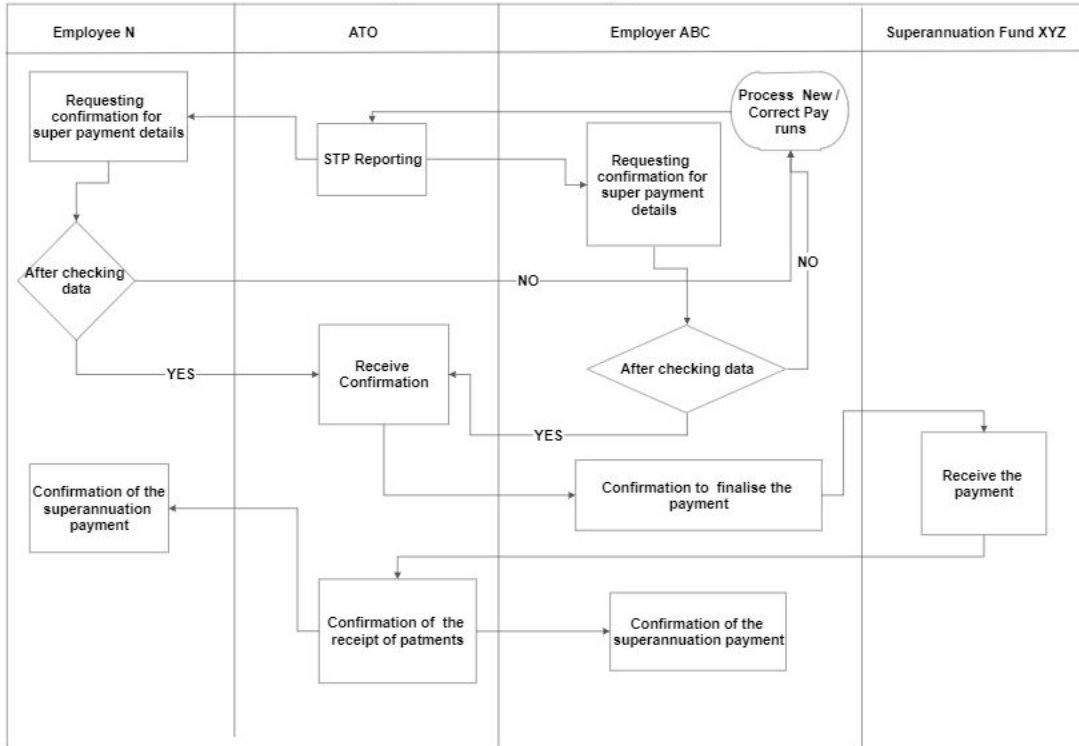


Figure 1. Superannuation payment process model

The above process diagram will be used to describe the super payment process. According to this process model the employer reports STP to ATO after each pay run and ATO records the superannuation payables in total. At the end of the super pay period, the ATO sends a confirmation request to the employer and employee to verify data such as, employee information including TFN, Superfund details, total super payable. If the information needs to be adjusted, the employer will need to file a new STP through a correct pay run. Otherwise, employer and employee approve the data. Then the ATO sends employer a confirmation to transfer money to the superfund, followed by a ‘Payment received’ endorsement by the superfund to the ATO. The process finishes with a message to the employer and employee to confirm the success of the superannuation contribution for that period. The researched believes that the suggested process keep all the parties in the circle which is advantageous to detect late or non-payments.

3.3 Expected contributions

Ensuring transparency, accuracy and security is critical in demonstrating the suitability of blockchain technology. For this reason, a blockchain application will then be developed to demonstrate its suitability. The designed model will be simulated using Ganache an open-source simulator (Jabbar 2020). This study will include superannuation contribution information, attack vectors to assess security, and delay time for the model during the simulation procedure. When the system is connected to multiple nodes, such as the government, employers, employees, and superfunds, there may be issues regarding the confidentiality of information that is permanently recorded in the blockchain model. As a result, it will be crucial to think carefully about the security of the blockchain model being used for superannuation contributions. The delay in the system will be the next important element. This might be a significant factor to consider when comparing the performances of the model when assessing the effectiveness of addressing the objectives of this research. A smart contract (program) in the blockchain application will be located on the host side which will trigger when an employer begins to make superannuation contributions to their employees' superannuation accounts. All provenance-related data can be stored on the distributed ledger because it is a shared medium between all partners. Following that, an independent third party could examine it to ensure compliance. The host will have the ability to monitor superannuation payments through the suggested procedure, making it simple to audit and find unpaid superannuation. This application is expected to enable data sharing among employers, employees, government agencies and superannuation firms. As a result, employers will be unable to ignore superannuation payments.

4. Conclusion

Superannuation payment frauds are still present, and government officials and business professionals have introduced a number of solutions to prevent and identify unpaid superannuation. The literature review also discusses the current method of identifying unpaid superannuation and the implementation of blockchain technology as a remedy for superannuation payment fraud.

This research-in-progress paper presented the literature review results. However, blockchain application is yet to be presented to demonstrate its suitability in preventing superannuation fraud. As this study used the Australian Superannuation problem as a case, this concept will therefore be restricted to the Australian business environment. In conclusion, the proposed solution will be useful in determining whether the superannuation contribution was successful when using dependable and durable technology like blockchain. Overall, this research shows that although blockchain technology has the potential to completely transform a variety of industries, it is crucial to be aware of its limitations and give serious consideration to its use cases before putting it into practice.

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