

# Structure and Sequence of Decision Making in Financial Online Social Networks

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**Abstract.** Online Social Communities and Networks (OSNs) have become a popular source of information for those seeking advice for everyday decision making. A key benefit of OSNs is known to be the provision of free and easy access to a wide range of information, largely unconstrained by geographical barriers and free of charge. This paper specifically addresses the potential use of OSNs as a support tool for financial decision making. The key objectives of this paper are to explore and identify the structure and sequence of decision-making phases in financial OSNs (FOSNs). This research uses Netnography - a qualitative research method to achieve these objectives. Key results suggest that most of the decision-making phases identified by Simon and Mintzberg are present in FOSNs and that the sequence of these phases tends to be anarchical.

**Keywords:** Decision making · Decision-making structure and sequence · Netnography · Online social networks · Financial online social networks

## 1 Introduction

Online social networks in the recent past have started to gain the attention of those in the financial sectors [2]. There has been a substantial increase in the amount of financial information, advice, services and tools that can be accessed online [21, 22]. Finance (encompassing money, financial wellbeing) is considered to be one of the most important elements in everyday life [16]. Financial issues or finance-related questions have been identified as one of the top ten most commonly researched topics on the internet [3].

Despite being a relatively new phenomenon, FOSNs play a significant role in the day-to-day dissemination of financial information and decision making for individuals and professionals within the financial industry. FOSNs provide many sources of online information that can include official listed companies, financial wealth management advisers and experts, financial institutions, stock traders, and others that can distribute investment information, including real-time market data, research, and trading recommendations. Therefore, it is understandable that FOSNs have become popular virtual space for individuals seeking information on personal finance, budgeting, investment strategies, stock market trading, or simply a place for self - education on financial matters [22]. Therefore, FOSNs have become a decision-making tool that is used to support

different types of decision making, ranging from the instrumental to the emotional and informational.

Regardless of advances in related technology, when faced with a DM situation, it is reasonable to assume that the core processes are similar. However, given the social and behavioral nature of the DM process, it is necessary to find evidence in reality to confirm the existence of a common core. Nowadays, the concept of reality is also related to the online world of human interaction. With the explosion of FOSNs and the potential wealth of information contained therein, we are interested in considering FOSNs as a support tool for DM. The primary research objectives are to explore, identify and understand (1) the structure of DM phases that is supported in FOSNs and (2) the sequence of DM phases assisted by the use of FOSNs.

## 2 Research Motivation and Objectives

Finance and financial-orientated research has caught the attention of the public and academics for centuries. By nature, it is a sensitive, personal and globally important topic. Even though the research into FOSNs has not gained the same popularity as, say, online branding and online shopping yet, but the significance of this topic cannot be underestimated. It is important to state that there is no lack of research with regard to OSNs, decision making, and finance as stand-alone subjects of interest. Despite these research topics being discussed within both academia and industry, the synergy of these themes provides an innovative and unique perspective. There is a research gap in how FOSNs support the decision making of key stakeholders: individuals, professional investors, listed firms and financial institutions as a decision-making information source, whether to seek for financial advice and/or to analyse market news, trends and fluctuations. Therefore this research study uses this unique opportunity and tries to discover a niche that has not been overly researched yet.

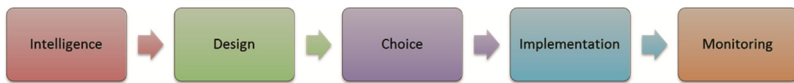
To overcome the problem stated above, we propose a set of objectives and requirements that should be addressed and further employed. This study not only wants to observe stakeholders' behaviour within FOSNs and conduct an analysis of their participation, but also aims to concurrently investigate the two following objectives: (1) Determine the structure of DM phases in FOSNs, specifically what decision-making phases are supported and influenced by FOSNs and identify any construct(s) that may not have been identified before in this context. (2) Explore the sequence of DM phases in FOSNs. This includes the proposal and validation of concepts relating to the sequence of the FOSN-based DM processes. It may be possible, through zooming in, to understand the relationship between the decision-makers and the process they undertake by using FOSNs.

The requirements for these objectives are to understand and define the DM processes, phases and sequence that are supported by FOSNs. This will be accomplished by using the chosen qualitative research methodology, Netnography, and conducting a Netnographic study across various categories of FOSNs. In the following section we look at DM processes, theories and concepts (Sect. 3). Thereafter, we proceed with the definition of Netnography as a chosen research method and the Netnography research process to

follow (Sect. 4). This will result in a detailed description of how the Netnography research process is undertaken in this study (Sect. 5). We continue with the discussion of findings from Netnography and how the research objectives and requirements have been met in Sect. 6. Section 7 concludes this paper by discussing the overall findings and the potential contributions of this research to the theory and practice of DM, OSNs and FOSNs, as well as potential future studies.

### 3 Decision Making

The history of decision-making (DM) research is long, rich and diverse. In terms of quantity, there is no shortage of frameworks, taxonomies, approaches and theories. Decision making is a complex field; it can involve the adoption of various technologies, in addition to having to accommodate the different psychological perspectives of individuals. One of the foundational and impactful theories in the field of behavioral studies in human decision making has been developed by Herbert Simon [4]. Simon [20] suggested that the decision-making process can be structured and ordered in three phases: intelligence, design, choice. Later, Huber and McDaniel [8] extended this model by adding two further phases: implementation and monitoring. Figure 1 presents the view on the decision-making process by Simon [20] with additions by [8].



**Fig. 1.** Decision making process (adapted from Langley et al. [11])

Intelligence is where the decision-maker is collecting information about the problem, identifying the problem and its cause. The design phase is where recognition and understanding of possible alternatives and consequences of the future decision occur. Choice is where identified alternatives and options are narrowed down to the best utility option that leads to a decision-maker's choice. The implementation phase is about actual execution of the chosen option, while monitoring relates to the consequences of the implemented option.

Other researchers, for example, Cooke and Slack [6] developed the sequential model based on Simon's model to explain decision-making as a cyclical process that focuses around the problem. Problem solving in their theory is not merely the three phases of the Simon model, but a continuous process of identifying the best alternatives and course of actions. Mintzberg et al.'s [15] model follows the linear structure from Simon's rational decision-making process and reflects the repetitive elements and incoherent phases of decision making. In this model, the decision-maker comes with recognition of a problem or tangible request that requires an action, with the solution coming in the form of different repetitive DM stages that do not necessarily follow the sequence.

Unlike rational and sequential models, decision-making theories emerged into an anarchical problem-solving process that is driven by events. There is no sequence for decision phases and there is no established process to follow. There are chaotic and

incoherent phases of decision making that build on need. In other words, this model is a free decision-making process that is more intuitive than the rational one developed by Langley et al. [11]. The decision-making process driven by events is similar to Cohen et al.'s [5] garbage can model of decision choice. The four streams that interplay in Cohen's model are problems, solutions, participants, and choice opportunities. Sinclair and Ashkanasy [19] developed a model of integrated analytical and intuitive decision making that supports two mechanisms of decision making: first, the decision-making process follows an intuitive behavior that is driven by events [5, 11]; and second, decision making is rational and structured in a logical order toward problem solving.

## 4 Research Methodology

This research primarily follows Kozinets' guidance in how to conduct Netnography [9, 10]. Netnography is a new approach in conducting exploratory research through the use of ethnographic principles that combines archival and online communications work, participation and observation, with new forms of digital and network data collection, analysis and research representation [10]. This method helps us to gain an understanding of human experience from online social interaction and/or content. The undertaken research steps and their description is shown in Table 1.

**Table 1.** The netnography research process

#	Steps	Description
1	Planning and entrée	Definition, identification, selection of research questions; communities; conversations of interest and categorisation of networks and participants
2	Data selection and collection	Observation, participation and engagement; filtering process, review and revisiting of conversation selection; collection challenges; obtaining and selection of a large sets of data for reading, analysis, and coding
3	Data analysis	Data interpretation process with the use: discourse, content and textual analysis, coding and noting
4	Discussion and findings	Representation and reporting of research findings and theoretical implications for the research objectives

## 5 Adapted Netnography Research Process

### 5.1 Planning and Entrée

The planning step requires the research questions and objectives to be defined. This has been done and stated in the earlier sections of this paper. The entrée involves the actual choice of networks of interest where the observation takes place first and then the researcher can proceed with data collection. There are networks and communities that are specifically designed to support the general public in finding answers to questions on financial matters (e.g. everyday budgeting, saving tips, retirement plan options,

passive investment strategies and financial news on economy and market updates). There are also more sophisticated financial services offered online, such as online platforms for trading currencies and shares, wealth management firms for providing financial planning advice and a variety of online money management tools offered to the public with diverse needs and requirements (e.g. mobile applications to track daily expenditure, mirror trading (following a financial expert’s trading strategy or investing in their portfolio via online routes) etc.).

For the purposes of this paper, we have adopted and modified the categorisation of FOSNs provided by Mainelli [12]. These three categories of FOSN are retail, support services and professional. Within these three categories we have identified communities of interest and their main topics; the mapping between FOSN categories and communities of interest (with the web links as an example) outlined in Table 2.

**Table 2.** Planning and entre: Mapping of FOSN categories and communities of interest

FOSN category	FOSN community and topics	Example
Retail	Investment options and strategies, Online wealth management service, robo-advising, insurance and retirement plans	<a href="http://www.nerdwallet.com">www.nerdwallet.com</a> <a href="http://www.boards.fool.com">www.boards.fool.com</a> <a href="http://www.barrons.com">www.barrons.com</a> <a href="http://www.wealthmanagement.com">www.wealthmanagement.com</a>
Support services	Saving and budgeting tips, Retirement advice, non-professional investment advice	<a href="http://www.savingadvice.com">www.savingadvice.com</a> <a href="http://www.reddit.com">www.reddit.com</a>
Professional	Professional Investment - Forex and share trading (i.e. mirror trading)	<a href="http://www.oanda.com/">www.oanda.com/</a> <a href="http://www.fxstreet.com">www.fxstreet.com</a>

One of the other important steps in the planning and entrée phase of netnography is an understanding of the participants on selected networks. Because the Internet has already been in existence for a substantial period, researchers have categorised online participants into various groups and come up with specific nomenclature [7]. The categorisation of OSN participants used in this study have been developed by Kozinets [9], who defined OSN users as being either Advisers, Seekers, Experts, or Observers.

*Observers* are less associated with community life, and are searching for the right information to support their decision or simply to find some clues to, or interest in, questions or answers. Observers are silent members of the group and the percentage of observers of a particular network/community cannot be easily identified. Rodan et al. [17] indicated that there is an approximately four to one ratio between people who have accessed the site and those who have posted in the communities. *Seekers* do not always have strong ties with an associated group. They are confident and brave enough to ask questions, start a thread on the topic of their interest, and look for support. Seekers are interested in immediate results – advice provided by advisers. Once seekers get the information or find answers, their relationships with the community might dissolve. *Advisers* have strong ties with a group, a high rate of participation, and take a strong interest in the group. Advisers are those who provide support to seekers in order to solve a problem. There are always two parts to the story: advisers can support decision-makers and at the same time mislead them. *Experts* have strong ties within the community and

their respect mainly depends on their profile, on which can be displayed their expertise, education, volume and past history of participation. Some advisers can fall into the category of experts, especially the ones with a high presence in the network, or, in some cases, ‘experts’ can be acting as administrators of networks. In this study, experts did not exist in every community that has been followed; but experts are important, especially in FOSNs.

## 5.2 Data Selection and Collection

The second step from the netnographic research framework involves data selection and collection. This is considered to be a delicate and important procedure that serves many purposes in the research approach [1]. Kozinets [9] recommends obtaining three different types of data during the data collection process, namely: archival, elicited, and field notes. This study took two types of data for the collection process. First, the written communications between different stakeholders that occurred in the online communities (archival) have been directly downloaded and saved for analysis. Second are the researcher’s self-authored field notes, in which the observation ideas and comments were recorded and synthesised in the analysis section.

Field notes can provide the first fresh research perspective on the data collected. Those that were taken from the observational process were mainly about the participants’ behaviour, FOSN design (i.e. background style, font style, graphical presentation, and features of the webpage), conversations styles for each community, financial tools that are offered to users (i.e. mortgage calculator, currency converter, financial adviser matching questionnaires, etc.). All of these can significantly amplify or attenuate the DM process of FOSN users.

The screening process proved to be a lengthy one: prior to screening, a list was drawn up of factors that are essential to this research and could help in identification and filtering the relevant communities and conversations from the pool of hundreds of FOSN websites. The search for suitable posts was conducted using search engines like Google and Yahoo Finance using keywords such as: top financial forums, top financial online investing platforms, best financial virtual communities, and etc.

After the identification of the networks of interest, the researcher tried to become familiar with the network by reading terms and conditions, searching for popular topics, topics by last dates modified, observing member behaviour, understanding login requirements and any other website design components that could influence the immediate attitude towards the network and subsequently affect the decision-making process. As a result, 10 websites were chosen (at least three per FOSN category) that had conversations related to the research questions and conversations showing the presence of the DM process and phases. A total of more than 30 posts were selected from the chosen websites. Statistically, one website could provide more than three conversations for analysis purposes. This analysis ensured that the conversations were not on a single subject and not conducted by the same participants; therefore the decision-making process is not repetitive, and different participants represent the voice of different demographics. Conversations were collected and separated according to the subject of interest (indicated in Table 2), phases of decision making and conversation headings. Each post

was assigned a specific code that indicates post subject correlated with the subject of interest.

One of the challenges of using online networks as a source of data collection is the abundance of data available. After the observation period, it was evident that the themes of conversations in FOSNs are repetitive and the major difference in participants' behaviour and the way conversations are structured and their sequence is dependent on the FOSN category, whether professional, retail or support services. Therefore, the number of conversations is not that essential: what was important was the variety of conversations and questions for decision making.

### 5.3 Data Analysis

Once conversations, posts and websites that are directly related to the research objectives are identified and the data collection process has taken place, the researcher starts sorting the data. That is where the data analysis process really starts. Data analysis process in a grounded theory approach has a generic sequence of common qualitative steps. We followed the procedure described by Milles and Huberman [14] that considers four steps that are applied to this study: (1) Generalising and Theorising: high level analysis of collected data; (2) Coding and Noting: identification of main categories and research concepts; (3) Abstracting and Comparing: supporting data, evidence, facts, identification of new categories; and (4) Checking and Refinement: revision of findings and developing of new concepts and insights.

More detailed analysis started when the collected data started to fall into particular categories and the pattern of findings could be identified. These categories came from the research theory and research objectives. The initial categories were taken from Simon's DM model [20] in which he concluded that a rational human mind goes through the phases of a DM process, those of Intelligence, Design, Choice, Implementation and Monitoring. In the repetitive process of analysis, with additional exploration of data, literature and pre-formed findings: the additional phases of the DM process were established, as well as new categories for further analysis and coding. The new categories were based on the existing phases of Simon's DM model [20], but with the addition of the use of FOSNs. This was achieved by observation and comparison of multiple conversations and networks.

The difference between real and online worlds is how people present and describe their future decisions or the experience of DM processes they already have. After revising the existing categories of phases of the DM process, the new categories within the adviser model emerged. Most of the time, the adviser provides a model of decision (design phase) based on their own previous experience of decisions made in the past, knowledge and insights. The adviser model can include options or alternatives provided. Therefore, the previous experience of the adviser expands the categories of the DM process.

Through revising the conversations it was also identified that seekers, in contrast to advisers, follow a real life conversation situation. By entering the community, they familiarise themselves with it and introduce themselves (in some cases) and their question, and provide a background on their decision-making situation; for example, seekers

introduce a situation with relevant background information that might assist advisers to advise on a solution, so they can make a good choice or leave without taking any responsibility for the decision to be made. In finance-related conversations, all the information that is provided by participants is usually relevant or closely correlated with the future/past decision making.

The background information provided by a seeker can be identified as an entry step into the DM process. In most of the observed conversations, the information provided followed the logical explanation, if relevant. There is not much human introduction in FOSNs as there would be in a real conversation: rarely will participants tell you where they are from or what they do for living. In the case of advisers, they mainly provide options and models at first, and only then is this followed with the background introduction. In most cases, their advice is based on their previous experience or existing knowledge. What is common and interesting about advisers and seekers is that both types of participants provide enough background information for DM, whether that be a seeker posting an inquiry or an adviser proposing a model, options, or alternatives.

Figure 2 illustrates the data analysis on the DM conversation phases, structure and sequence from the three categories of FOSN that this study observed. It shows how the

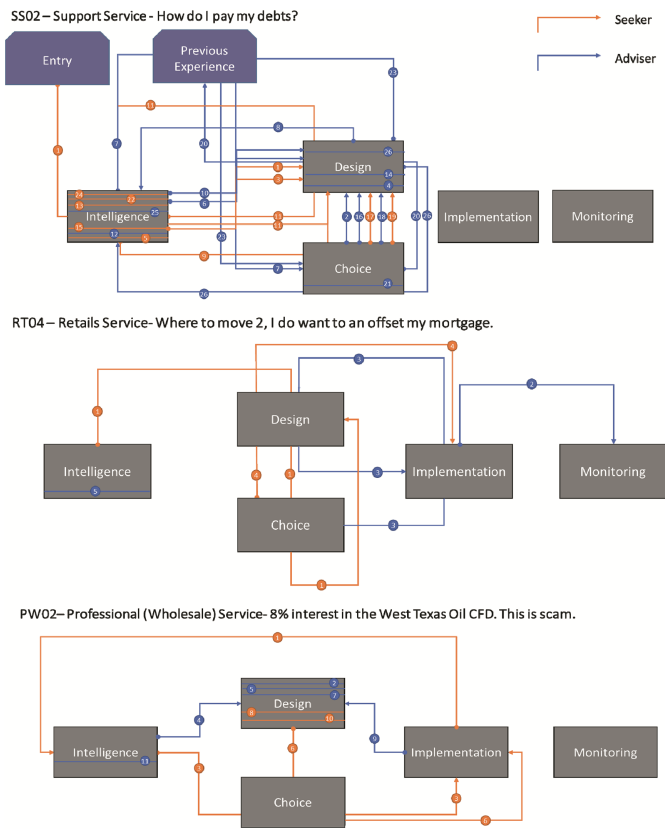


Fig. 2. Analysis on DM phases, structure and sequence in FOSN (Conversations Analysis)



phases of DM process are interconnected in the online environment that makes the DM process follow the anarchical structure. The phases of the DM process are visible, but the sequence in which the conversations move between them is unstructured and appears random. In the Fig. 2 - SS02 conversation, it is interesting to note that most advisers started their conversation by stating the choice – the “decision” to be made first - and only then proceeded with the explanation of the advice provided.

Another aspect that has emerged during the analysis process is advertising. In FOSNs, online advertising undoubtedly affects the decision-making process [18]. Advertisement posts in FOSNs can be easily recognised and be identified by readers; most of the time people are openly advertising their services (i.e. financial brokers, asset management firms) with relevant credentials and experience. However, advertising or self-advertisement as a service does not fit into any of the phases of the DM process. It can be an influential factor, and therefore has been indicated as an additional step present in the DM process, especially in an online environment.

## 6 Structure and Sequence of Decision Making in FOSN

To understand the structure and sequence of FOSN conversations, this study coded the collected conversations to Simon’s DM-process phases.

*Intelligence Phase (I):* With the use of an FOSN, the decision-maker is capable of retrieving information in real time in a matter of seconds. FOSNs are not standard search engines, but can provide information according to the search query or problem. Furthermore, it was evident that, through the use of an FOSN, the decision-maker can find similar problems and already-developed solutions that have been tested and evaluated by other members of networks. Therefore, FOSNs can enhance the intelligence phase of the decision-making process by providing access to a variety of data sources and different formats of data (visual, textual, mathematical, and graphical) [13].

*Design Phase (D):* The design phase is all about alternatives and models of outcomes and consequences and additional questions that might lead to a better design option for DM. An FOSN provides an opportunity for decision-makers to explore alternatives by simply asking for advice or browsing through the different FOSNs of interest. An FOSN also can attenuate this phase by simply presenting already-developed models of solutions that were provided by other members of the FOSN. Decision makers are not required to accept the provided models, but they can evaluate them and find them useful or irrelevant; the selection process leading to the choice of the right alternative is one of the sub-processes of the design phase, before making a choice.

*Choice Phase (C):* The choice phase in FOSN was found to be present, specifically in professional networks where investors could replicate the adviser’s strategy and show their financial gains or losses; and also it could be seen in the posts where a seeker returns to the thread to post the choice made or acknowledge that the thread had been reviewed and used in a real-life environment.

*Implementation and Monitoring (IM and M)*: The implementation phase was found to be partially present in FOSNs, even though originally it was anticipated that it would be difficult to observe. Monitoring could be detected in professional or retail networks, mainly when seekers were coming back to share the results of the decision made and the consequences, or some part of the adviser's options or models.

The FOSN can also help the decision-maker in identifying and providing tools and resources that can assist in the DM process (i.e. the use of a budgeting spreadsheet, mobile application apps for everyday monitoring of spending, online investment portfolio accounts where performance is monitored online). Moreover, an FOSN can assist users in conducting a post - analysis evaluation of the financial decision made (e.g. review of a report, or analysis of an asset wealth management service provider).

If the decision is viewed from the perspective of the 'initial issue' such as conversations between seekers and advisers in FOSN, then the phases of the DM process do not have a sequence and do not follow any logical process. What is interesting is the difference between how an advisers post their choices made in the past as part of their previous experience and how seekers provide background information based on their experiences of past decisions. Advisers, when suggesting a choice to make, usually start the conversation with a clear statement - the choice to be made - and then proceed with a description of their advice and reasoning (Design-Model (D) – Intelligence (I)), while seekers usually follow the opposite sequence when explaining their DM. It usually started with Intelligence (I) – background information on the decision to be (already) made; C (Choice) and/or need; and D (Design-Model) – options and alternatives available to them.

## 7 Conclusion

From the discussion above, it is apparent that an FOSN is used as a support tool which helps to (1) find relevant information, understand alternatives, options, choices and consequences; (2) observing and sharing the DM process experience; and (3) identifying the necessary resources for implementation and evaluation of outcomes from decisions taken. Based on our analysis using netnography as a research methodology, it is evident that online conversations support most of the phases of the decision-making process identified by Simon and Mintzberg; however, our results indicate that the phases in online conversation do not follow Simon's [20] sequence of a rational decision-making process and that the sequence of these phases tends to be anarchical.

However, Simon's study mainly concentrated on analysing the behaviour of rational decision makers in the DM process. The main thoughts, discussions and considerations that took place in this study were focused around the subject of the DM process and how it can be supported by an FOSN. Rational models of decision-making emphasize structure and sequence while anarchical models of decision-making imply that there is no structure and sequence in many real-world decision making contexts. However our results challenge both these models by suggesting that decision making on FOSNs exhibits structure but not sequence.

The findings of this research study suggest that certain DM processes observed in FOSNs, from an overall perspective, are in some way related to the well-known model of an anarchical DM process driven by events developed by [11]. The impulsive phases of the DM process are recognised and evolved as needs of the decision maker arise. Also, the observation validates the pattern of the DM process as being the interplay of four streams (problems, participants, solutions and choice opportunities) [5]. A decision is generated by various opportunities, alternatives, associated problems and people. Discussions in FOSN environments involve individuals (as advisers or seekers) and models of choice, with alternatives and possible options that can be recommended by people or provided from their experience. The observed FOSN DM process was found to have no structure and displayed anarchic behavior; it also exhibited characteristics similar to the Mintzberg et al. [15] model of the DM process as an iterative sequence.

Using discourse and conversational analysis for the data interpretation from netnography, it was observed that not every phase of DM was present in every conversation. It was not surprising to realise that FOSNs are more structured and result-orientated networks and are always about figures, statistical analysis and predictions. On the other hand, this phenomenon could not be found to exist in the Support Service FOSN category, nor, more specifically, in everyday budgeting and retirement conversations. It was also observed that whether in support-orientated or retail FOSNs, advertisements were found to be present; in some cases, the advertisers were targeting seekers specifically by using FOSNs as a tool. Therefore, the key results suggest that most of the decision-making phases identified by Simon and Mintzberg are present in an FOSN and that the sequence of these phases tends to be anarchical.

One of the unique findings of this study that will be further explored in detail in future studies is the use of online financial tools provided by FOSNs, either for free or for cost. That is where the rise of technological advances could be predominantly seen. This factor has been recognised across most of the categories of FOSNs: even regulated websites and networks have provided links or easily downloadable tools for managing a specific matter of interest. Other considerations for future research include: first, an expansion of the scope of the research categories of FOSNs - the number of posts and websites analysed. This might contribute to the identification of new phases of the DM process; second, a future study should carefully consider the import of FOSN location because each country has different investment schemes, retirement plans and financial regulations, legislation and obligations pertaining to professional and personal use. This also affects the decision-making style of the decision makers; and a third area of investigation for future study is global market manipulation by FOSNs. After conducting this study, it will be beneficial to understand how and if the conversations posted online on financial matters might lead to overall market fluctuations or, in some cases, manipulation.

Virtual financial communities are real, significant and growing. Organisations have only started to scratch the surface of how technology can help to build these communities. It is not the technological capability that is important; it is the ability of new technology ideas to secure communities' trust, i.e. managing risk and reward. The technology is here. What is needed are novel ideas for using that technology. Ideas for building virtual financial communities will succeed if they attract, engage and retain people, build trust and spread to new people.

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