The Journal of Prediction Markets 2014 Vol 8 No 2 pp 76-88

IDEAS MARKETS: A LITERATURE REVIEW AND CLASSIFICATION SCHEME

Patrick Buckley[*]
University of Limerick

Eoin McDonagh
University of Limerick

ABSTRACT

Prediction markets have been positioned in the literature as efficient and scalable information aggregation mechanisms. The increasing interest in the use of market mechanisms to enable decision making has led to attempts to use these mechanisms to stimulate innovation in a number of organisational contexts. These tools, usually referred to as Ideas Markets are seen as a potentially powerful method of sourcing and evaluating new ideas. Whereas traditional Prediction Markets allow participants to trade on the outcome of uncertain future events, Ideas Markets' provide a platform for the generation and evaluation of ideas through the trading of virtual stocks representing products and concepts. In this paper, we study the evolution of research on Idea Markets though a comprehensive literature review. We develop a classification scheme, which enables thorough analysis of current trends within Ideas Markets research. Our results show that case studies detailing corporate applications of Ideas Markets dominate the current literature. The paper contributes by providing a comprehensive guide to the extant literature on Ideas Markets. This serves a number of purposes, including providing practitioners and academics with a convenient bibliography of the current literature. The issues highlighted by this literature review also serve to both motivate and enable further research.

1 INTRODUCTION

In the modern hyper-competitive business environment, seizing and retaining competitive advantage requires organisations to continually improve their products, services and processes (Porter, 1996). Therefore, the stimulation of organisational innovation is considered a "key lever in achieving strategic success" (Chesbrough and Appleyard 2007,p.60). However, constantly innovating to create value is intellectually and financially challenging. Moreover, traditional internal innovation methodologies are becoming increasingly costly and strained as product lifecycles shorten. This challenge has prompted practitioners and researchers to consider new methodologies for prompting organisational innovation.

[*] Correspondence address: Patrick Buckley, E-mail: Patrick.Buckley@ul.ie

One concept which is the subject of attention in this context is utilizing the 'wisdom of crowds' to prompt innovation. These approaches seek to improve outcomes and develop innovative solutions by leveraging the cognitive diversity inherent in large groups of people and aggregating knowledge that is widely dispersed amongst large and diverse population (Surowieki 2006). Paradigms such as Open Innovation and Social Production focus on utilizing collective intelligence to prompt organisational innovation (Chesbrough and Appleyard 2007; Benkler 2008). They emphasise the importance of involving as many stakeholders as possible in innovation processes and "*assume that firms can and should use external ideas as well as internal ideas*" (Chesbrough, 2003).

One approach which seeks to operationalise the ideals expounded by Open Innovation, Social Production and similar paradigms is Ideas Markets. Proponents suggest that Ideas Markets can be a cost efficient and effective method of stimulating innovation. Their potential has excited interest amongst both practitioners and academics. This paper adds to this research effort by making a number of contributions. It provides a comprehensive literature review which will serve as a starting point for practitioners and academics who wish to navigate the growing body of literature on the topic. It provides a classification scheme which can be used both to guide research and also identify fertile areas for further research.

The rest of the paper is organised as follows. First, we introduce the concept of Ideas Markets and distinguish them from similar tools such as Prediction Markets and Preference Markets. We identify the organisational benefits ascribed to Ideas Markets in the literature. In the methodology section, we describe how we conducted the literature review, while in the following section we present our results and describe the classification scheme used in the paper. We conclude by highlighting some open research questions which have emerged from the literature review.

2 MARKET BASED INFORMATION AGGREGATION MECHANISMS

Prediction Markets have been proven as effective mechanisms for aggregating participant knowledge in order to forecast the likelihood of an event occurring (Chen et al 2003; Forsythe et al 2003; Kou 2004; Berg et al 2007). Common applications for Prediction Markets include sports betting exchanges such as Betfair and Betdaq and websites dedicated to the prediction of political events such as the Iowa Electronic Market. They work by assigning a stock or security to the outcome of a future event (Tziralis and Tatsiopoulos 2007). Participants then trade these stocks with the aim of increasing their overall portfolio value. Prediction Markets are an effective way to transfer and aggregate information relevant to an event in real time. Prediction Markets have been proven useful in areas outside of pure

prediction including decision support, identifying lead customers and in forecasting project deadlines (Tziralis and Tatsiopoulos 2007).

A key feature of Prediction Markets is that "assets are liquidated on the basis of the ex-post realisation of the underlying variable" (Marinovic and Norman 2013, p.2). This means that the value of a given security in a Prediction Market is ultimately determined by an event or result outside of the market itself. In general, the outcome will be unambiguous and independent observers will agree on an interpretation of this event. This is how the payoffs are determined for Prediction Markets (Slamka *et al* 2009).

A specific type of Prediction Market called an Ideas Market has recently been proposed as a useful platform for the generation, filtering and evaluation of new product ideas and concepts.

There are two key differences between a Prediction Market and an Ideas Market. First, an Ideas Market stock value is not automatically resolved at the close of the trading period (Slamka *et al* 2009). The concepts and ideas traded on an Ideas Market may range from relatively concrete to quite abstract. Participants use judgement and intuition to value stocks in Ideas Markets (Chan *et al* 2001). The different between the underlying assets being traded on a Prediction Market versus an Ideas Market is vitally important. In a Prediction Market, the outcome being traded will eventually either occur or not occur. In contrast, in a Ideas Market, where participant are trading on concepts such as "*Which of these will be the most successful product?"* or "*Which of these process improvement ideas will be most effective?",* no absolutely correct answer can be derived. For this reasons, Ideas Markets cannot reward participants using the payoff mechanisms usually associated with Prediction Markets (Slamka *et al* 2009). This places the additional burden of designing a payoff mechanism on market makers (Soukhoroukova *et al* 2012).

Second, the number of stocks in an Ideas Market is not pre-determined by the market maker. In a traditional Prediction Market, the stocks being traded on the market are created in advance by the market maker, and do not change over the lifetime of the market. In an Ideas Market, individual participants are able to add new stocks to the market at any stage. This functionality improves the ability of the Ideas Market to generate innovative proposals, as participants can constantly suggest new solutions which can then be evaluated by the group. This functionality also distinguishes Ideas Markets from Preference Markets (Soukhoroukova *et al* 2012). As with Ideas Markets, Preference Markets allow participants to trade stocks that may not necessarily have an objective outcome. However, like traditional Prediction Markets, Preference Markets forbid participants from adding stocks to the market on the fly.

The literature suggests that Ideas Markets have substantial potential for prompting innovation in organisations. The functionality of Ideas Markets lends then two significant advantages. First, by allowing participants to

dynamically suggest new stocks, Ideas Markets encourage employees to develop and expound innovative solutions to problems. The literature suggests that this can create a virtuous circle, where one participant's proposal will prompt another to make a more refined proposal. Second, the use of the market mechanism to rank the proposals leverages collective intelligence and should lead to an improved selection process.

The literature offers a number of specific applications of Ideas Markets. It suggests that Ideas Markets have considerable merit as support platforms for what is often referred to as the "fuzzy front end" of product development (Soukhoroukova *et al* 2012). In this case, large groups of stakeholders are asked to evaluate potential new product lines. Other authors suggest than they can be used to collect employee suggestions from process improvement (Lindic et al, 2011)

3 METHODOLOGY

The key objective of this paper was to collect and study the extant literature on Ideas Markets. An initial corpus of relevant articles was generated from an existing literature review dating from 2007 on Prediction Markets (Tziralis and Tatsiopoulos 2007). As the concept of an Ideas Market is a relatively novel one, which emerged from the literature on Prediction Markets, this represents a valid starting point. The research referenced in this literature review was then analysed with a view to selecting any work that was related to Ideas Markets. This process involved the selection of any of the literature that;

a) either contained original Idea Markets content
b) was likely to lead to other authors who had previously dealt with the area

Initial filtering was conducted on the basis of the title of the paper, and led to the selection of 105 articles (from a total of 155) for further review. Detailed analysis of the article abstracts reduced this number to 26 articles, which were subjected to a comprehensive review. After this review, 2 articles from the literature review were found to be directly relevant to Ideas Markets. Considering their relatively novel nature, this is unsurprising.

The next research activity involved a general search for relevant literature. The databases used from this search were Google Scholar and the ISI Web of Science. The most obviously relevant search term to use was "Idea Market". However, as has been previously noticed, there is often confusion with regards to the terminology used in this area (Tziralis and Tatsiopoulos 2007). In order to ensure that relevant sources were not overlooked, we used a similar approach to that used in the previously mentioned literature review. As well as the term "Ideas Markets", a list of terms synonymous with Prediction

Markets derived from the literature were used as initial search keywords. Those terms were then combined with phrases describing key distinguishing aspects of Idea Markets, such as "Idea Creation", "Idea Generation", "New Ideas" and "Product Development", to create a final search term. By searching for key phrases that were found in the articles already located in conjunction with each of the recognised terms for Prediction Markets the search results were smaller and more relevant.

The results of each individual search term were then collated, removing any repetitions. This part of the selection process yielded a total of over 500 unique articles. After applying the same filtering process as previously described, 18 unique articles fitting the project assumptions were returned. When combined with the two previously identified articles, this led to a total of 20 articles directly relevant to Ideas Markets being identified in the study. This figure was lower than initially expected, but reflects our strict adherence to the previously identified criteria regarding the inclusion of research.

4 CLASSIFICATION SCHEME

Having identified the literature relevant to Ideas Markets, our next task was to classify this literature. Initially, we assigned each relevant article to one of three classifications. The first category, Applications was applied to papers that describe the implementation of an Idea Market either in a corporate or academic setting. The second category, Market Design was applied to the literature that focused on some aspect of the functionality of the Idea market itself. The last category, Descriptive, was assigned to papers that describe prediction Ideas Markets theoretically. These papers did not include data on an actual implementation of an Ideas Market. Figure 1 displays the percentage of literature found in each category is displayed. Of the 20 sources examined 10 (50%) are classified in the Applications category, 4 (20%) are placed in the Market Design category and the remaining 6 (30%) are in the Description category.

The majority of the literature to date has focussed on describing applications of Ideas Markets. Given the relatively novel nature of Ideas Markets, this is unsurprising. It is likely that formal research which focuses on optimising market design and other theoretical issues will emerge once the basic credibility of the concept has been demonstrated. With regards the specific implementations which are discussed in the literature, Figure 2 demonstrates that the vast preponderance of the implementations occur in practitioner settings. Nine of the relevant articles discussed Ideas Markets operating in practitioner contexts, while only one described an Ideas Market operating in an academic setting. This contrasts with the siting of many of the studies referenced in the extant Prediction Market literature, and can be seen as an indication practitioner interest in the concept of Ideas Markets.

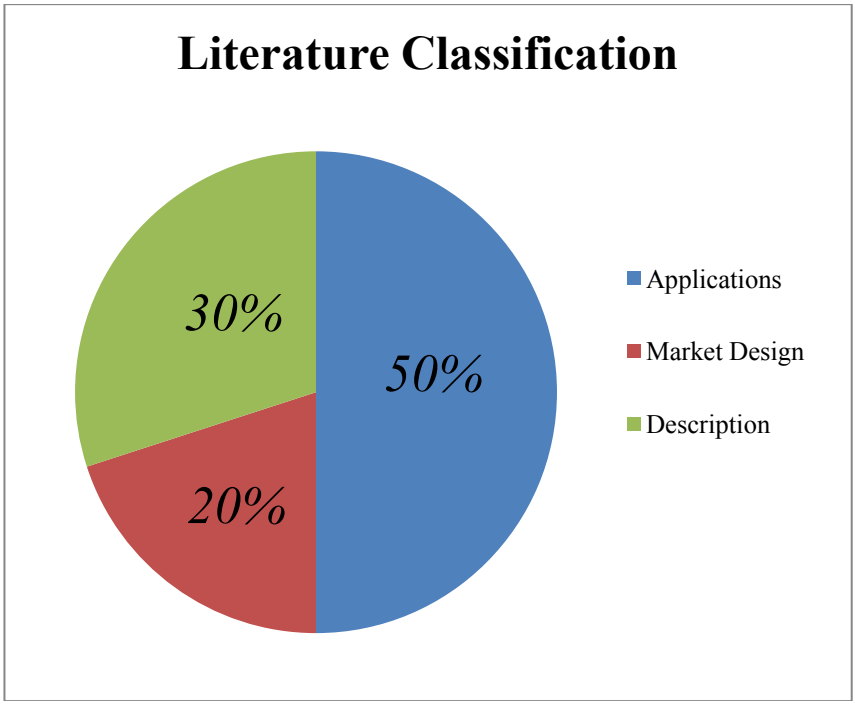

Figure 1: Literature Classification

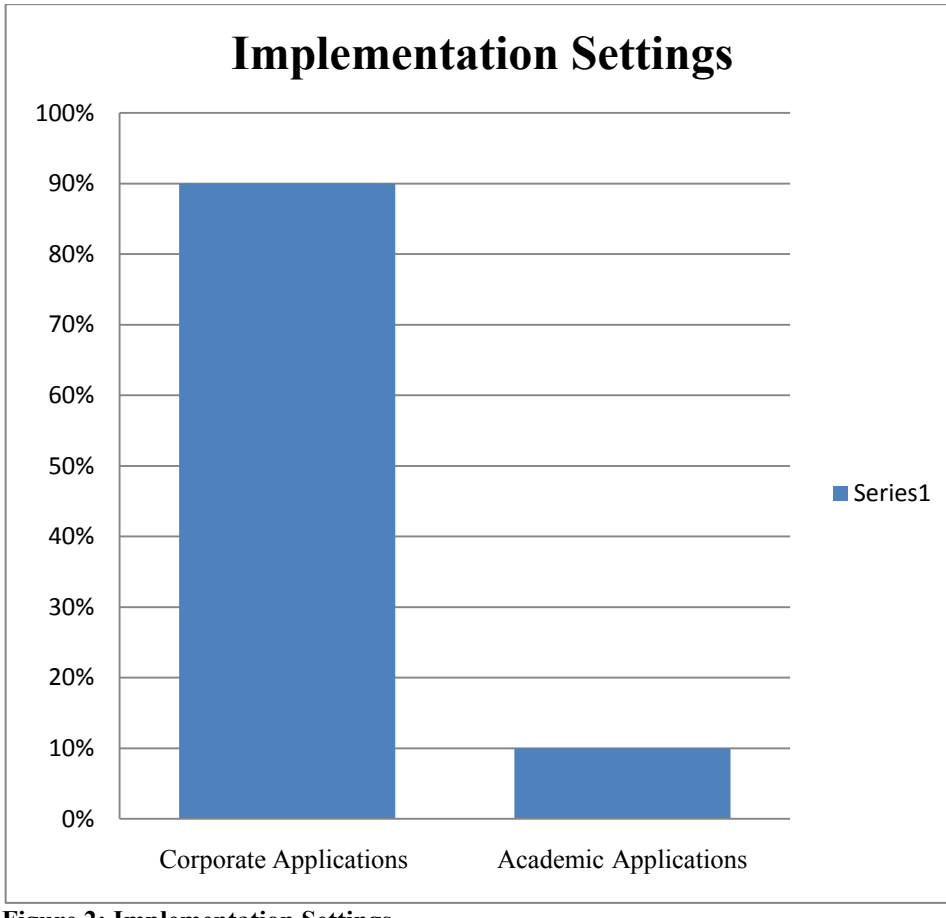

Figure 2: Implementation Settings

Four articles were classified as being related to market design. Figure 3 highlights that the published research was evenly split between Software Design Research and research on Payoff Mechanisms.

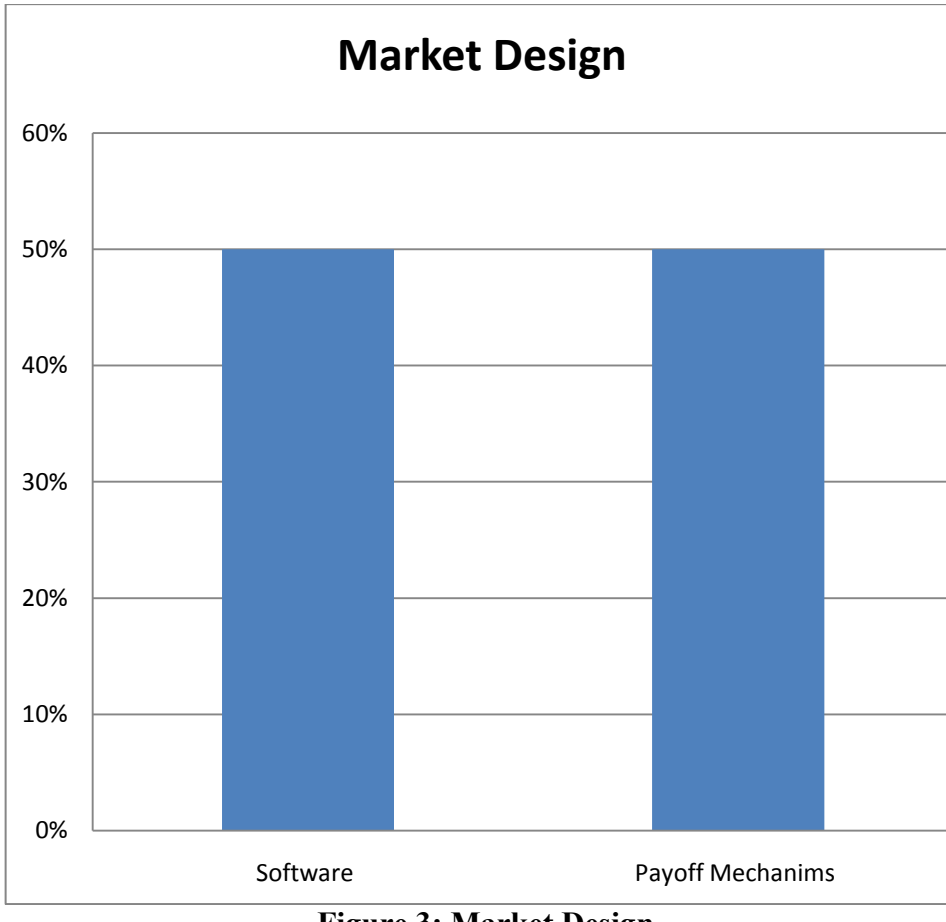

Figure 3: Market Design

Descriptive articles, which focussed on theoretical descriptions of Ideas Markets were further divided into articles which provided a rudimentary description of the concept, and articles which compared Ideas Markets to other innovation stimulation tools. Of the six articles assigned to this category, four provided basic descriptions, while two compared Ideas Markets to other tools.

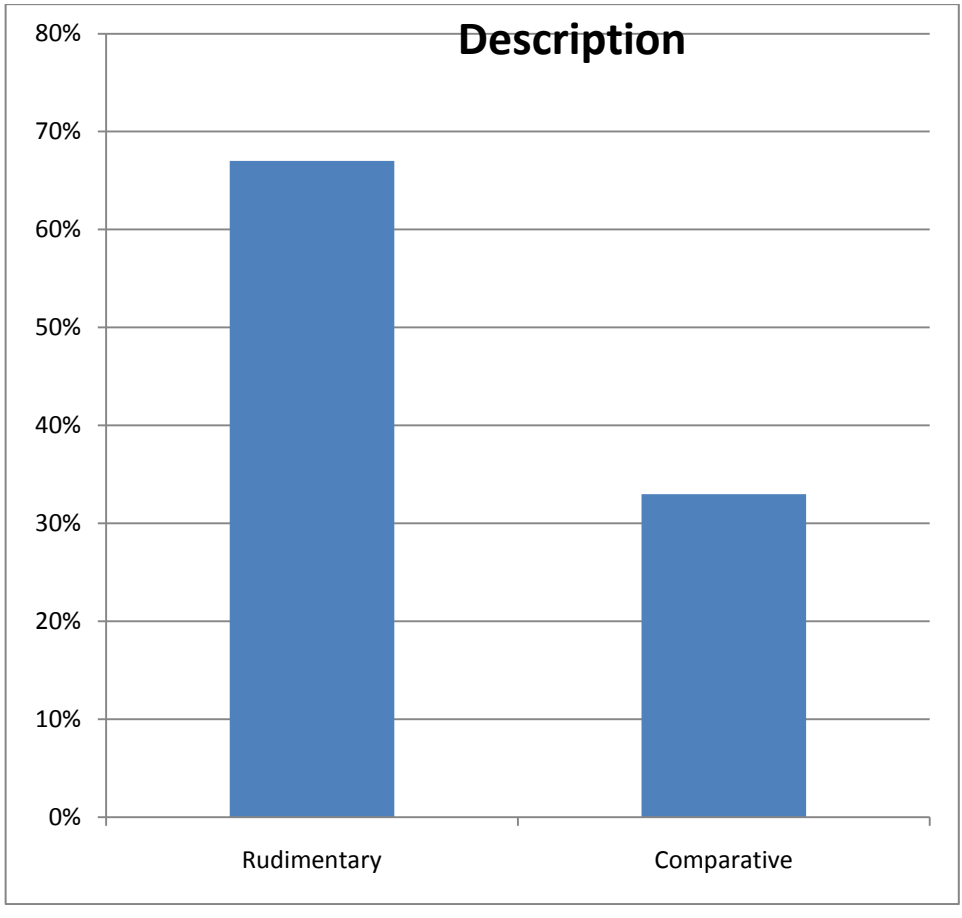

Figure 4: Descriptive Articles

In order to provide a quick reference for other researchers, the specific categories and the articles assigned to each are displayed in the following table.

Corporate Applications	LaComb, C.A., Barnett, J.A., and Pan, Q. (2007), Spears, B., Lacomb, C. and Barnett, J. (2009), Levy, R. (2009), Lavoie, J. (2009), Soukhoroukova, A., Spann, M. and Skiera, B. (2012). Soukhoroukova, A., Spann, M. and Skiera, B. (2007), Burnham, B.Y.K. (2009), Lauto, G., Valentin, F., Hatzack, F. and Carlsen, M. (2013), Ottaviani, M. (2009)
Academic Applications	Soukhoroukova, A. and Spann, M. (2007)
Software Design	Bothos, E., Apostolou, D. and Mentzas, G. (2009a), Bothos, E., Apostolou, D. and Mentzas, G. (2009b)
Payoff values	Slamka, C., Jank, W. and Skiera, B. (2009), Marinovic, I., Norman, P. (2010)
Rudimentary	Kamp, G. and Koen, P.A. (2009) , Kamp, G.P. (2009) , Schröder, J., Slamka, C., Skiera, B., Spann, M., Geyer-schulz, A., Franke, M., Weinhardt, C. and Lukner, S. (2012), Jones, J.L. and Collins, R.W. (2009)
Comparative	Bothos, E., Apostolou, D., Mentzas, G. (2012), Brachos,D., ,Kafentzis,K., , Samiotis,K., and Bothos, E. (2009)

5 CONCLUSIONS AND FUTURE RESEARCH

This study aimed to perform a comprehensive review of the extant literature on Ideas Markets. After search and filtering for relevant research, 20 articles were found to be directly relevant to the topic. At first glance, this small corpus of results would seem to indicate that Ideas Markets are a relatively minor concern. This conclusion should be treated with caution for a number of reasons. First, in selecting articles for inclusion in our corpus, we applied rigorous standards. Articles had to describe the use of a market mechanism that shared two characteristics. The market has to allow participant to add stocks dynamically and the assets underlying the stocks being traded had to be uncertain in nature, and not amenable to objective evaluation. These criteria meet the strict definition of an Ideas Market. However, they are strict, and are arguably too restrictive in the context of a relatively novel concept, which is still be defined. The other reason to withhold judgement on the significance of Ideas Markets is their inherent novelty. As a concept, Ideas Markets have only emerged in the last 5 years. This is a relatively short period of time in which to expect a large literature to emerge, particularly given the lead times associated with academic research.

Any conclusions based on such a limited data set must be treated with caution. However, some trends can be observed in the literature. At present, published work in the literature focuses on describing application of Ideas Markets, particularly in corporate settings. This suggests that there is at least

some practitioner interest in Ideas Markets, and serves to recommend further research to establish their utility and effectiveness.

A number of interesting research questions emerge from the synthesis of the literature which was created as part of this study. A number of papers commented on the importance of allowing participants to use communication channels other than buying and selling stocks. The most commonly used tools were comments attached to trades and message boards. These text based tools allowed participants to convey far more information to other participants. This functionality moves away market based mechanisms Ideas Markets are rooted in, but arguably provide richer communication channels that may serve to prompt innovation. Further research in this area would be welcome.

In a similar manner to Prediction markets, and for similar reasons, the reward scheme used by an Ideas Market is a crucial determinant of performance. There is little empirical work investigating the effectiveness of the reward schemes that can be used in Ideas Markets and their relative performance. Investigating these issues would be a significant step in allowing the reliable deployment of Ideas Markets in a practitioner context.

A final issue which emerges from the extant literature is the limited context that most studies occur in. Ideas Markets have so far been deployed in large, hi-tech firms. Empirical investigation of how Ideas Markets perform in other contexts such as SME's or public sector bodies would serve to identify what contexts are suitable for Ideas Markets, and which would be more suited to other tools and approaches.

REFERENCES

Y. Benkler 'The Wealth of Networks: How Social Production Transforms Markets and Freedom, (London, Yale University Press, 2008).

J.E. Berg, F.D. Nelson and T.A. Rietz 'Prediction market accuracy in the long run' (2008) 24 *International Journal of Forecasting* 2 pp 285–300. doi:10.1016/j.ijforecast.2008.03.007

I. Blohm, C. Riedl, J. Leimeister and H Krcmar, H. 'Idea Evaluation Mechanisms for Collective Intelligence in Open Innovation Communities: Do Traders outperform Raters?,' (ICIS, Shanghai, 2011) pp 1–24.

E. Bothos, D. Apostolou and G. Mentzas 'Collective intelligence for idea management with Internet-based information aggregation markets' (2009a) 19 *Internet Research* 1 pp 26–41.

E. Bothos, D. Apostolou and G. Mentzas 'IDEM: A Prediction Market for Idea Management' (E-Business Systems, Paris. 2009b) pp 1–13

E. Bothos,D. Apostolou and G. Mentzas 'Intelligence with web-based information aggregation markets : The role of market facilitation in idea management' (2012) 39 *Expert Systems With Applications* 1 pp 1333–1345

D. Brachos, K. Kafentzis, K. Samiotis and E. Bothos 'Enhancing Innovation:The role of Idea Markets in Evaluating Ideas' (2009) 1 International journal of sustainable Strategic Management 4 pp 434–450.

B.Y.K. Burnham, 'Motorola Prediction Markets.' (2009)
N.T. Chan, N, A.W. Lo, E. Dahan and T. Poggio 'Experimental Markets for Product Concepts' (MIT Labs, 2001).
K. Chen, L.R. Fine, and A. Bernardo 'Predicting the Future' (2003) 5 *Information Systems Frontier*s 1 pp 47–61.
H.W Chesbrough *Open Innovation: The new imperative for creating and profiting from technology* (Boston: Harvard Business School Press, 2003)
H.W. Chesbrough and M.M. Appleyard 'Open Innovation and Strategy' (2007) 50 *California Management Review* 1 pp 57–77
E. Dahan, and J.R. Hauser 'The virtual customer' (2002) 19 *Journal of Product Innovation Management* 5 pp 332–353.
E. Dahan, A.J. Kim, A.W. Lo, T Poggio and N. Chan 'Securities Trading of Concepts (STOC)' (2009)
E. Dahan, A. Soukhoroukova and M. Spann 'New Product Development 2.0: Preference Markets—How Scalable Securities Markets Identify Winning Product Concepts and Attributes' (2009) 27 *Journal of Product Innovation Management* pp 937–954.
E.F. Fama 'The Behavior of Stock-Market Prices Eugene' (1965) 38 Journal of Business 1 pp 34–105.
R. Forsythe, F. Nelson and Rietz, T. 'Results from a Dozen Years of Election Futures Markets Research' (2003)
T.S. Gruca, J. Berg and M. Cipriano 'The Effect of Electronic Markets on Forecasts of New Product Success' (2003) 5 *Information Systems Frontiers* 1 pp 95–105.
J.L. Jones and R.W. Collins ' Information Markets : A Research Landscape' (2009) 25 *Communications of the Association for Information Systems* 27 pp 289–304.
G. Kamp and P.A. Koen 'Improving the Ideas Screening Process within Organizations Using Prediction Markets : A Theoretical Perspective," (2009) 3 *The Journal of Prediction Markets* 2 pp 39–64.
S.G. Kou ' Forecasting the Vote: A Theoretical Comparison of Election Markets and Public Opinion Polls' (2004) 12 *Political Analysis* 3 pp 277–295
C.A. LaComb, J.A. Barnett and Q. Pan 'The imagination market' (2007) 9 *Information Systems Frontiers* 2 pp 245–256,
G. Lauto, F. Valentin, F. Hatzack and M. Carlsen 'Managers at Work: Managing Front-End Innovation through Idea Markets at Novozymes' (2013) 56 Research-Technology Management 4 pp 17–26,
J. Lavoie 'The innovation engine at rite-solutions: Lessons from the CEO' (2009) 3 *The Journal of Prediction Markets* 1 pp 1–11
R. Levy 'Socialized Innovation Tapping into Motorola' s Collective Intelligence None of Us Is as Smart as All of Us' (2009)
J. Lindic, P. Baloh, V.M. Ribière and K.C. Desouza 'Deploying information technologies for organizational innovation: Lessons from case studies' (2001) 31 *International Journal of Information Management* 2 pp 183–188.
I. Marinovic and P. Norman 'Modeling Idea Markets : Between Beauty Contests and Prediction Markets' (2010)
I. Marinovic, M. Ottaviani and P. Sorensen 'Modeling Idea Markets : Between Beauty Contests and Prediction Markets' in L.V. Williams (ed) *Prediction Markets:Theory and Applications*, (London, Routledge, 2011)
I. Nonaka 'The Knowledge-Creating Company' (2007).
M. Ottaviani 'The Design of Idea Markets : An Economist's Perspective' (2009) 3 *Journal of Prediction Markets* 1 pp 41–44.

M.E. Porter 'What is strategy?' (1996) 74 *Harvard Business Review* 6 pp 61–78

J. Schröder, C. Slamka, B. Skiera, M. Spann, A. Geyer-schulz,M. Franke, C. Weinhardt,and S. Lukner *Prediction Markets : Fundamentals , Designs , and Applications*, (Verlag Gabler Wiesbaden, Germany,2012)

B. Skiera and M. Spann *Opportunities of virtual stock markets to support new product development* (Verlag Gabler Wiesbaden, Germany,2004)

C. Slamka, W. Jank and B. Skiera 'Second-Generation Prediction Markets for Information Aggregation: A Comparison of Payoff Mechanisms' (2009) *SSRN Electronic Journal*

A. Soukhoroukova, A and M. Spann 'New Product Development with Internet-Based Information Markets: Theory and Empirical Application' (ECIS, Regensburg, 2007)

A. Soukhoroukova, M. Spann and B. Skiera 'Creating and Evaluating New Product Ideas with Idea Markets' (2007) 94 *Produktinnovaion Mit*

A. Soukhoroukova, M. Spann and B. Skiera 'Sourcing, Filtering, and Evaluating New Product Ideas: An Empirical Exploration of the Performance of Idea Markets' (2012) 29 *Journal of Product Innovation Management* 1 pp 100–112

M. Spann, H. Ernst 'Identification of Lead Users for Consumer Products via Virtual Stock Markets' (2009) 26 *Journal of Product Innovation Management* 3 pp 322–335

B. Spears, C. Lacomb, J. Barnett and D. Dogonaksoy 'Examining trader behavior in idea markets: an implementation of GE's imagination markets' (2009) 3 *Journal Of Prediction Markets* 1 pp 17–39,

J. Surowieki *The Wisdom of Crowds*, (New York, Doubleday, 2006)