# Comparison of Multi-criteria and Prediction Market Approaches for Technology Foresight


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## Résumé

Cet article présente et compare deux approches originales de veille technologique basées sur un paradigme antagoniste: une approche des sciences de la gestion (prise de décision multicritère) versus une approche participative (marché de prédictions). Elles sont toutes deux destinées à soutenir la gestion d'un portefeuille technologique ainsi que l'évaluation de nouvelles technologies dans le cadre d'une organisation active dans les technologies de l'information. Pour évaluer la pertinence de notre recherche, nous avons réalisé plusieurs expériences dans un environnement réel. Les résultats ont montré que la rigueur des sciences de la gestion combinée au côté participatif du Web 2.0 était un atout dans le cadre de la veille technologique. De plus, un cadre conceptuel a été établi pour comparer les deux approches.



**Mots clefs :**
Veille technologique, multicritère, marché de prédictions, Web 2.0



## Abstract

This paper presents and compares two original approaches for technology assessment and foresight based on opposite paradigm: a management science approach (Multi-Criteria Decision-Making) versus a participatory approach (Prediction Market). These approaches are intended to support the management of a technology portfolio and the assessment of new technology by an IT organization. In order to explore the relevance of the research, we conducted several experiments in real environments. The results demonstrated that the rigor of management science and the participation of the Web 2.0 approach are complementary strengths for technology foresight. Furthermore, a framework has been established to compare the two approaches.



**Key-words:**
Technology foresight, multi-criteria, prediction markets, Web 2.0

# Introduction

According to McKeen and Smith (2003), one of the critical issues in IT management is to "situate the challenges facing the IT managers regarding emerging technology …". This requires companies to adopt a systematic process to stay up-to-date and assess new technology for a potential integration into modern organizations.

This paper focuses on two approaches that support the assessment and foresight of new technology in order to evaluate how businesses can take advantage of them. Different management tools and techniques have been proposed in the scientific community and the literature (scenario planning, technology roadmap, ROI, real option) but few of them have been widely adopted by companies.

In this paper, we present and compare two approaches we designed and evaluated in two recent research projects. In addition, we also propose a certain number of critical success factors which makes one or the other approach more appropriate to be used in certain corporate conditions. The first completed research assumed that a management science approach, "multi-criteria decision-making (MCDM)", is well suited for technology foresight. The second in-progress research investigates a participatory approach, based on Web 2.0 tools, "prediction market (PM)". We used and validated both approaches during the assessment mobile payment technologies.

In the next section, we present some work that has been done in technology forecasting methods comparison. Section 2 introduces the two explored approaches. In Section 3, we describe the two designed artifacts, which support our experiment detailed in Section 4. Section 5 summarizes the results obtained with both approaches. In Section 6, we use a theoretical framework to compare the two approaches and provide several key success factors. Finally, we conclude and propose further research in Section 7.

# 1. Related Work

Several authors studied the choice and the usage of technological forecasting methods in different types of organizations. Porter et al. (2003) introduce technology futures analysis (FTA) as a field grouping all forms of analyzing future technology and its consequences. After presenting and classifying more than 50 methods, they present two scoping issues of TFA: the content issues (i.e., time horizon, geographical extent, level of detail) and the process issues (e.g., participants, decision process, study duration, resources available).

In his paper, Martino (2002) presents a review of recent advances in technological forecasting based on eight methods and shows the resulting possibilities from these new approaches.

Presenting the implementation issues of technology intelligence systems, Savioz et al. (2001) notes the importance of the organization specificities in setting up such a system.

Levary and Han (1995) identify six main factors affecting technological forecasting and the choice of a method (money available for development of technology, data availability and validity, uncertainty surrounding the success of technological development, similarity of proposed and existing technologies and number of variables affecting the development of technologies). They also studied the prerequisites for use of specific technological forecasting methods.

Lichtenthaler (2005) conducted an exploratory case study research in leading multinationals that identified the most influential contingency factors for the selection of technology intelligence methods and assessment forms.

Lichtenthaler (2004) also presents the importance of the type of coordination of the technology intelligence process (structural, hybrid and informal) as well as the selection of information sources in the choice of a specific method.

We found that none of this previous work elaborated a comparison of selected approaches with their strength and weaknesses related to their contextual implementation.

Leonard-Barton (1999) describes a dual methodology for case studies about the same phenomenon, offering opportunities for complementary and synergistic data gathering and analysis.

In this paper, we propose to establish a comparison framework based on characteristics derived from past research previously presented. This framework aims at helping us to compare our two approaches and identify their key success factors.

# 2. Presentation of the Approaches

The two selected approaches for our research differ on many aspects. Before comparing them, we briefly describe their aim and context of usage.

## 2.1. MCDM: A Management Science Approach

MCDM methods aim at supporting decisions in an effective way by analyzing a problem using either quantitative (e.g., cost, weight) or qualitative (e.g., quality of service, beauty) criteria simultaneously and concurrently. The idea behind MCDM methods is not to find the optimal solution (like a mathematical programming model) but rather try to determine what solution is the closest to be "optimal" in regards of several criteria or among existing solutions. To collect the data, decision-makers (i.e., experts) need to express their preferences by evaluating the alternatives and weighting the criteria.

Previous research indicates that MCDM methods are not only used for decision-making but also for technology foresight (Salo et al. 2003). Three distinct phases of the decision have been characterized by Simon (1955). These are intelligence, design, and choice. Bui (1984) argued that MCDM methods usually focus on the two last phases. In our case, the objective is to use MCDM methods for the intelligence phase of the decision process. The idea is to examine the current environmental conditions and unveil potential future issues before the establishment of the decision.

## 2.2. Prediction Markets: An Emerging Approach

Prediction markets are future trading platforms whose contracts are ideas rather than goods or services. They have been used in many different contexts and often produced more accurate forecasts than traditional methods (Berg et al. 2003; Spann et al. 2003; Wolfers et al. 2004). Still considered as an emerging approach, they enable everybody to trade by aggregating the information disseminated among all actors in a corporate crowd (e.g., employees, business partners). Furthermore, they allow actors to trade based on their own assumptions, without taking care on the hierarchy or other social pressures. Hanson (1992) made the assumption that prediction markets should improve the progress of science based on the absence of social, economical or political pressures.

Previous research (Gaspoz and Pigneur 2008) showed that the information disseminated in the crowd was not equal to the information reported among the hierarchy. This difference was partially explained by the anonymity of the traders on the prediction market and by the rewarding process, based on the best performances (i.e., the quality of the information supplied).

# 3. Design of the Artifacts

In order to support our research, we designed two artifacts implementing the MCDM and "prediction market" approaches. As research methodology, we adopted a design science paradigm and rigorously followed the recommendations prescribed by Hevner et al. (2004). We developed iteratively and incrementally both artifacts with build-and-evaluate loops. More details about the artifact implementing MCDM methods can be found in earlier work (Ondrus et al. 2006). Similarly, the prediction market platform was also described in a previous communication (Gaspoz and Pigneur 2008).

## 3.1. MCDM: A Group Decision Support System

The requirements for a multi-actor multi-criteria analysis are not easily fulfilled, as a great amount of data has to be collected, computed, and visualized. Obviously, a digitalization of the processes is necessary. In other words, we decided to use an IT artifact (i.e., a Group Decision Support System, GDSS) integrated with the processes of an MCDM approach. As none of the existing MCDM tools surveyed encompassed the features needed, we designed a new and original prototype with unique characteristics required for our research. We concentrated our efforts on the development of an interactive user interface in order to improve data collection, computation, and visualization.

Our prototype, PylaDESS, implements side-by-side two formal MCDM methods: ELECTRE I (Benayoun et al. 1966) and the Weighted Sum Model (WSM) of Fishburn (1967). To collect the data, we selected an interactive process based on the "Pack of Card" technique proposed by Simos (1990) and later improved by Pictet and Bollinger (2003). We programmed this technique in PylaDESS in order to facilitate data collection. Experts can evaluate technologies using a five value scale (i.e., weak (1), fair (2), average (3), good (4), excellent (5)) for each criterion they estimate as relevant.

To improve the visualization and analysis of the data, we implemented many different data cross-analysis modules. All of these features make PylaDESS a unique MCDM tool to support multi-actor and multi-criteria analysis.

The iterative and incremental development of the IT artifact was done in laboratory and its testing was organized in a real environment. The design iterations allowed us to better manage the different constraints encountered during the analysis. In total, three distinctive iterations have been conducted. First, the artifact has been used in back-office for manual data input and computation the data. During the second design iteration, the artifact has been used in front of the experts to collect the data with card game and give a real-time feedback of the results computed. The third iteration consisted of using the artifact as a group support system in roundtable setting. During each of these iterations, numerous improvements have been done in order to adapt the artifact for each context with its constraints.

## 3.2. PM: e-Trading Market

To develop the prediction market platform, we conducted three design iterations of the build-and-evaluate loop. We also used the three Steps for Designing a Virtual Stock Market from Spann and Skiera (2003) to determine the requirements of our artifact.

The multiple evaluations of our artifact and the refinements of our design led us to formulate five propositions to design a prediction market for R&D portfolio management (Gaspoz and Pigneur 2008). These propositions were used to design the platform for our current experiment presented in Section 4.

The main specifications instantiated are the use of a specific ontology in order to allow each trader to acquire the same comprehension of contracts and claims, coupled with participative discussions between the participants.

We also implemented an IPO mechanism allowing any actor to propose new technologies on the market, without requiring a review process or preliminary validation of his proposition.

Due to the fact that most of the participants are not confident with trading mechanisms and concepts, we removed almost all financial concepts from the interface in order to reduce the trader's learning curve.

In order to increase the motivation of the participants, we designed an experiment which alternates between group and individual trading sessions. Group sessions are essential as it allows us to quickly obtain an evaluation of the technologies because of the high volume of transactions on the market.

Finally, in line with recommendations of several researchers (Hanson 2003, Pennock 2004, Spann and Skiera 2003), we implemented an automatic market maker, allowing the traders to buy or sell when new information is available. Thus, the market aggregates more information compared to a double auction market were the traders have to wait for a corresponding offer to make the deal.

## 3.3. Comparison of the Artifacts

The designed artifacts are quite different in their nature. PylaDESS is a standalone application coded with Python programming language. It runs on most popular operating systems (MS Windows, Mac OS X, and GNU/Linux). In terms of specific algorithms to compute the data, it implements two formal MCDM methods and produce visual outcomes (i.e., rankings and outranking graphs). Moreover, there are different visualization modules to conduct cross-data analysis. More details of PylaDESS features can be found in (Ondrus et al. 2006).

The e-trading market architecture requires a web server and an Internet connection. The user interface is based on web standards such as HTML, which is compatible and reachable with any computer using a web browser. It supports buy and sell operations and displays current trading information (e.g., price, volume). The trading mechanisms and market maker were implemented with Python scripts based on Hanson's (2003) algorithms.

# 4. Settings of the Experiments

To explore our approaches for technology foresight, we applied them in the field of mobile payments. Based on previous research (Ondrus and Pigneur 2007), we selected several possible alternatives for future technology developments in the Swiss mobile payments market.

In order to conduct a foresight process, we assessed current payment technologies and added possible future upcoming technology. By mixing both current and future technologies, we are able to estimate more precisely the impacts of future trends based on the existing market conditions.

For the technology alternatives, we selected three types of cards: (i) SmartCards (chip-based), (ii) Contactless cards (RFID-based), and (iii) Magnetic cards (with magnetic strips). We also included two phone-based technologies, one using a phone remote network (e.g. GSM, GPRS) and another one based on phone proximity networks (e.g. Bluetooth, Infrared). In a second phase we added an upcoming technology, Near Field Communication (NFC). This technology is a fusion of the mobile phone and the contactless card. More precisely, the mobile phone can act as a RFID tag or reader. More information about RFID and NFC can be found in (Want 2008).

## 4.1. MCDM: Visiting Swiss Experts

During a first phase, we assessed the current technologies present on the Swiss market. We started this phase in November 2005 and finished it in May 2006. We selected 20 of the major companies involved in payments in Switzerland and visited each of them once or twice; depending on how much time they could give us.

The structured interviews lasted in average between half an hour and an hour, sometimes more. In general, we had between one and three experts representing the companies. All selected experts were leaders of mobile payments projects in their respective companies.

During the interviews, we used our computerized "Pack of cards" technique to elicit the preferences of the experts. The computerized process enabled direct input in PylaDESS and a real-time feedback of the results.

The second phase of the research (i.e., NFC assessment), consisted of a real-time group setting. This roundtable aimed at inviting all the companies that participated during the first phase of the project. 16 experts representing 14 different companies came to the roundtable in October 2006. This roundtable had two distinctive parts. The first part consisted of a presentation of the previous results obtained. During the second part, we distributed individual forms for each expert to evaluate NFC using the five-value scale, as done before. After having inserted and computed the data in PylaDESS, we immediately exposed the results to the experts.

## 4.2. PM: Gathering the Crowd

We ran a prediction market based on the selected mobile payment technologies with twenty-nine master students in business information systems. Christiansen (2007) showed that our crowd size is over the minimum threshold of participation to ensure well-calibrated results. The one-month experiment took place in May 2008. Twenty students were active on the platform. We recorded 390 trades representing 6291 shares from four markets containing thirteen claims. Six of these claims were directly related to the technologies used in the MCDM approach.

The setup of the experiment did not require more than three working days. This includes the setup of the markets and user accounts. Furthermore, a presentation of the platform, its markets and claims was made in class. On the students' side, the investment is tightly linked to the number of trades made during the month. This includes the research of an investment opportunity based on information available to the trader, passing an order and looking at the new portfolio worth.

The incentive to play on the prediction market was a prize for the trader with the highest worth at the end of the experiment. This incentive alone was not sufficient to have a continuous trading volume on the market, so we introduced two short-term contracts during the experiment, resulting on trading peaks on the market.

Finally, to insure sufficient trades to extend the market accuracy, we used two strategies. First, we presented all markets and claims in details during the class, allowing students to ask questions on the claims and on related issues. We completed this presentation with on-line material presenting each claim in detail, accompanied with presentation videos. Second, we used a market-maker to allow the traders to quickly get their information aggregated on the market.

## 4.3. Comparison of the Settings

As can be seen in Table 1, the settings for both approaches differ on several aspects.

| | MCDM | PM |
|---|---|---|
| **Who** | Selected experts | Students (crowd) |
| **Where** | One or two individual interviews with each company.<br>+ One roundtable for all the experts to meet, discuss the results and evaluate NFC | One group meeting to start the market and some trading activities. Later, The participants continue to trade alone anytime and anywhere. |
| **When** | Nov. 05 – May 06<br>+ Oct. 06 | May 08 (1 month) |
| **How** | Several months for setup, trips, phone calls, analysis | Few days for setup and analysis |

**Table 1. Differences of experiments' settings**

A considerable effort is required for the MCDM approach compared to the PM approach, especially for the data collection process. Each company and experts need to be met individually. The experts need more support during their elicitation of preferences than the traders, who just buy or sell.

A multi-criteria analysis requires a relatively great amount of data to collect. The best way to proceed is to meet the experts in a face-to-face mode. The advantage of this direct contact is a personalized assistance and interaction during the whole process. This should prevent erroneous data sets.

In the prediction markets, the participation of the players is self-organized. This facilitates the overall management of the analysis. However, the success of the prediction markets outcome depends on the good willing of the players to participate and trade without the pressure of the project managers.

# 5. Analysis of the results

## 5.1. MCDM: Ranking and Outranking

From the results obtained, it was quite clear that card technologies were preferred to phones for payment purposes. The general ranking obtained with the WSM method shows that cards, especially smartcards and contactless cards, were preferred with a high ranking.

Phone-based solutions remain in last positions of most rankings. This could be explained as mobile phone-based payment schemes are still in an early stage of development. Our results show that there is still progress to be made in terms of ease of use, cost, reliability, and user/market acceptance (i.e., awareness). However, phone-based schemes already perform well in terms of flexibility and value proposition improvement. The three national mobile network operators consider value proposition improvement to be an important aspect, which explains why they believe that mobile phones have some future as a payment instrument. Due to space limitation, we could not describe results in more details. A complete description of the results of the first phase can be found in (Ondrus and Pigneur 2007).

During the second phase, the results showed that NFC is well evaluated. Its ranking is high and comparable to contactless and smartcards. It is clearly performing better than the other mobile phone technology tested in the first phase. A deeper analysis of the results is described in (Ondrus and Pigneur 2008).

## 5.2. PM: Price of Contracts

Due to the fact that the students were relatively well informed on this topic and made an intensive use of information disseminated, the results are the expression of a good consensus between the traders. We could observe that after a period of important variations during the first two weeks, the prices tended to reach a consensus at the end of the experiment while the volume of trades stayed at the same level.

On the *Mobile Payment Technologies* market, we can distinguish two claims' groups. The first group composed of NFC, smartcard and RFID was the most active in term of trades and all technologies reached a "price" over 50%. The second group gathered claims with few trades and probabilities under 50%.

Our results indicated that NFC could be considered as the next successful technology in the mobile payment field. The price history shows a regular adaptation to reach the consensus of 57.2%. We also saw a convergence of smartcards and RFID technologies to reach a probability just above 50%.

On the other end the mobile phone proximity and remote technologies had only few trades. The reason for this disinterest could be the lack of available information or the lack of confidence from the traders. In any case, the results of these two claims are not significant.

Finally, magnetic card made a low score, supported by many trades. We can interpret this result as a clear sign of the gentle eviction of this technology on the payment market. Even if the magnetic strips are still available on most of the cards, these cards also contain a chip, which put them in the smartcards category.

## 5.3. Comparison of the results

The results of the prediction market are globally similar to the ones obtained with the MCDM approach. Table 2 summarizes these results.

| MCDM | PM |
|---|---|
| 1. SmartCard (3.8/5) | 1. NFC (57.16%) |
| 2. NFC (3.6/5) | 2. SmartCard (52%) |
| 3. Contactless Card (3.6/5) | 3. Contactless Card (52%) |
| 4. Magnetic (3.3/5) | 4. Phone proximity (51.20%) |
| 5. Phone proximity (2.7/5) | 5. Phone remote (49.51%) |
| 6. Phone remote (2.7/5) | 6. Magnetic Card (47.01%) |

**Table 2. Summary of the results (ranking)**

The similarity of the results obtained is essential, as we want to compare both approaches. Unfortunately, due to length limitations, we are not able to display more detailed results with interpretations. Nonetheless, the main purpose of the paper is a theoretical and practical comparison of the approaches and their key success factors of applications in corporate contexts.

# 6. Comparison and Discussion

To compare our two approaches, we derived a framework based on the contingency factors developed by Lichtenthaler (2005) and the individual factors affecting technological forecasting from Levary and Han (1995).

Lichtenthaler found that the contingency factors influence the choice of assessment forms and technology intelligence methods used in multinationals. Levary and Han designed a framework to define the most appropriate forecasting method(s) for various combinations of the degree/extent of individual factors affecting technological forecasting.

The combination of the two groups of factors enables us to embrace the technological foresight activity globally and systematically from the organization characteristics to the information collection through the assessment process.

The resulting framework contains three main components: the *organizational factors*, the *assessment properties*, and the *data attributes* (Figure 3).

By *organizational factors*, we mean all factors determining the environment of the assessment process. These factors could be the resources availability, the organization's internal communication culture or the decision-making style.

The *assessment properties* are the characteristics of the assessment conducted in a given organization. These properties could be the assessment's goal, the time horizon of the prediction or the uncertainty of the assessment field.

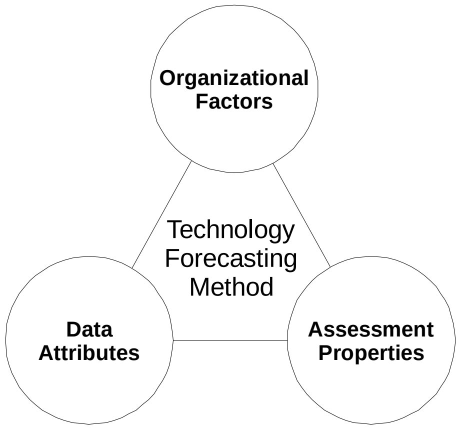


**Figure 3. Framework of comparison**

Finally the *data attributes* are the characteristics of the data needed for the technology forecast like data quality and availability. We also distinguish between exogenous and endogenous data collection processes. In the exogenous processes, we do not worry about the provenance of the data and the channel used to collect them. The endogenous processes imply that we integrate a data collection process in the method.

## 6.1. Organizational factors

These factors are specific for every organization. Even if they are not directly related to the assessment made, they will define its conditions and modalities. Often, they are implicitly embedded in the choice of a method, excepted for the resources. Time, human or financial resources dictate more or less the conditions of the assessment. In the case of limited resources, familiarity with the various methods will play an important role in restricting the choice of options.

The MCDM approach is well suited for organizations with formal and less participatory decision-making processes. This approach relies mainly on some selected experts at the expense of the crowd. MCDM methods may be difficult to implement in more participatory organizations, as the number of possible participant is limited for practical reasons. Likewise, the experts need a good knowledge of the method, both for the assessment and the interpretation of the results.

To make an efficient use of prediction markets, the organization must have a participatory and informal decision-making style. We need to open the market to the most players in order to aggregate more information. Due to their design, prediction markets does not require indepth knowledge of the method. Participants just have two possible actions: buy or sell. Furthermore, the results are quite simple to interpret. Given the short implementation time of this method, it is well suited for fast moving organizations or for organizations with limited resources. A challenge is to get participants to actively and regularly trade on their own. Otherwise, the results obtained might not be significant.

In the MCDM approach, the actors involved are usually a set of selected and relevant experts who are motivated to participate in order to get access to the data and therefore knowledge that would augment their expertise.

In prediction markets, the participants are anybody interested in technology but are not always experts ("the crowd of Web 2.0"). They constitute a community of players who are driven by the game and its financial profits. As opposed to the MCDM approach, the prediction markets can easily indicate if players are good by considering the value of their portfolio and their total profit.

### 6.2. Assessment properties

The main property is the goal, which specifies whether to assess the current environment or to generate knowledge about the future. Properties also describe the nature of the information to be generated. Depending on the needs, we might require a static or dynamic picture of the trend studied.

The MCDM approach gives a posteriori results to support the resolution of a decision problem. At a specific time, the MCDM analysis draws a rather detailed picture of a situation benefiting from the granularity provided by the criteria. These criteria help explaining precisely the reasons of the outcome.

On the contrary, prediction markets are excellent tools for longitudinal studies due to the inherent nature of the data collection process. However, they give the prediction (i.e., the claim's price) without further explanations. In other words, MCDM methods are detailed snapshots taken at certain times and prediction markets are movies shot over a period of time, suitable for assessments requiring frequent or permanent updates

### 6.3. Data attributes

In MCDM, the data collection process is endogenous since experts elicit their preferences using criteria and alternatives previously established. As a result, a double risk of bias exists during the establishment of the criteria and alternatives and during the elicitation of the preferences. As the method cannot identify any bias introduced by experts, it may be necessary to couple MCDM with a Delphi analysis to avoid having too large disparities.

In the case of prediction markets, the data collection process is exogenous. Full interest is given to the assessment. The rest of the process is left to the crowd. Prediction markets are not affected by unreliable information, due to the aggregation mechanism. Prediction markets are well suited in cases when information is not available or potentially unreliable.

### 6.4. Key Success Factors

Based on the comparison, we propose some key success factors for MCDM and prediction markets applied in technology foresight. Our recommendations should support further explorations of these approaches.

MCDM methods are well suited for situations when a group of relevant experts want to confront their opinions in order to unveil weak signals of technology trends. On their side, prediction markets need a crowd ready to trade and share their beliefs. Their actions generate a prediction through an implicit data aggregation mechanism relying on information disseminated among the crowd. This works particularly well when the corporate crowd is familiar with the topic.

To setup an MCDM analysis, a facilitator should be hired to meet each expert individually. Face-to-face meetings are essential to share the results, as they are usually centralized in standalone software. Prediction markets only need a facilitator who can setup a claim on the platform. Then, traders can play anytime and anywhere using a web browser. The major challenge of prediction markets is to gather a motivated crowd, which trades regularly.

The efforts required for the MCDM approach are rewarded with insurance that the set of data collected is valid since the facilitator supervises the whole process. To overcome this issue in prediction markets, the crowd automatically regulates the market. Even if a trader introduces a bias in the market by doing irrational actions, the crowd would neutralize him/her by doing opposite actions. At some point, the defective trader will be evinced, as his/her financial resources to trade would vanish.

MCDM methods are used when experts need to have a precise explanation of the phenomenon. The criteria, weights, and evaluations are useful indicators for unveiling possible weak signals. In our case, the results were rankings and outranking graphs. Looking at the data collected, we could explain precisely how we reached these outcomes. As a result, the establishment of a consensus could be reached after several rounds of analysis (i.e., Delphi). Prediction markets' outcome is by nature a consensus of the crowd based on many rounds of trades. The aggregated results provide a simple but powerful indication of the probability that an event would occur. In addition, one can analyze the evolution of the trends by just looking at the history of price traded. However, it is much harder to explain the behavior of the traders over time.

## 7. Conclusion

Despite similar results, both approaches revealed some benefits and demonstrated their complementarity. On one side, the MCDM approach brought an analytic explanation of the phenomenon by a controlled and criteria-based evaluation. On the other side, prediction markets provide a synthetic aggregation of numerous individual beliefs that is constantly adjusted and made available for everyone. Therefore, we could not claim that one is better than the other. Interestingly, we found that the drawbacks identified could partially be solved by opting the best aspects of both approaches.

For example, we could take consecutive snapshots during a given period of time to follow trends using a MCDM approach. Moreover, after few rounds of analysis, we could improve the data collection process by building an online user interface which would support the elicitation of the preferences without a face-to-face confrontation.

For prediction markets, the quality of the players could be ensured by opening the markets only to a practice community with its experts. Furthermore, the outcome of prediction markets could be enhanced by requesting more information about the actions of the players. The objective would be to monitor the behavior of the players in order to confirm that they are not just following the trend generated by the market.

In this paper, we presented two different promising approaches for technology foresight. We found that the combined strengths of the MCDM approach and prediction markets could be exploited for technology assessment and foresight to improve IT investment decisions.

In order to compare our two approaches, we built a framework that contains essential dimensions to differentiate technology foresight methods. Using this framework enabled us to derive several key success factors for each of our approaches.

For further research, we propose to extend this research by improving our current framework and compare other technology foresight approaches.

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