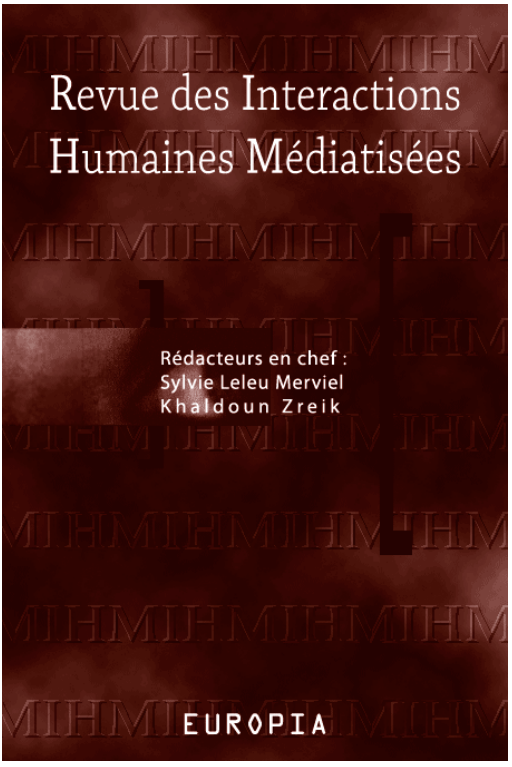
Revue des Interactions Humaines Médiatisées

Journal of Human Mediated Interactions

Rédacteurs en chef : Sylvie Leleu-Merviel & Khaldoun Zreik

Vol 20 - N°1/ 2019



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Sommaire

Editorial

Ce nouveau numéro de R.I.H.M., *Revue des Interactions Humaines Médiatisées*, qualifiante en sciences de l'information et de la communication, propose en ouverture un premier article sur une thématique rare : l'intelligence économique et la fabrique du sens dans le milieu associatif palestinien. Les trois articles suivants sont consacrés aux interactions numériques : apprentissage de la batterie en ligne, système d'information pour les photographies présidentielles aux Archives Nationales, dispositif tablette dans le cadre d'une visite muséale en présentiel.

Le premier article est une collaboration franco-palestinienne. Il étudie l'apport de l'intelligence économique au management des associations à but non lucratif. Un Processus d'Aide à la Décision, accolé à la sémiotique-situationnelle de Mucchielli ont été employés. L'originalité de l'étude tient à l'incorporation d'un cadre de fabrication de sens/signification à un processus d'aide à la décision multicritère portant sur des valeurs organisationnelles.

Le deuxième article étudie l'efficience d'une solution de type technologies numériques (animations, vidéos avec incrustation de plans multiples etc.) et réseaux sociaux (site internet *Batterieenligne*.fr) pour l'apprentissage de la batterie. L'étude est menée dans deux directions : - un inventaire de ce que permet et ne permet pas un site de ce type par rapport à un cours traditionnel en présentiel ; - une enquête auprès de 739 utilisateurs du site pour recueillir leurs avis sur les forces et les limitations de ces situations d'apprentissage.

Le troisième article propose une méthode de conception et d'analyse de systèmes d'information pour les humanités numériques. Le système d'information développé dans le cadre d'une recherche-action a pour objectif de valoriser les reportages photographiques des présidences de la République française en accès libre sur le site des Archives Nationales. L'article montre comment la numérisation des documents et leur mise à disposition sont analysables en termes de métamorphose documentaire et d'hybridation des données.

Enfin, le dernier article étudie le rapport qui s'instaure entre un lieu physique (un musée et ses œuvres, en l'occurrence le Palais des Beaux-Arts de Lille - France) et ses visiteurs, lorsque la déambulation est accompagnée et guidée par un dispositif tablette testé auprès de 130 enfants autistes, déficients intellectuels, sourds, précoces et sans handicap. Il répond aux questions suivantes : l'interaction exclusive avec la tablette fait-elle disparaître le lieu réel et virtualise-t-elle la promenade ? ou le lieu réel reste-t-il prépondérant, l'appui de la tablette relevant alors de la réalité augmentée ? enfin, la présence d'un jeu pour chaque œuvre fait-il basculer le tout vers le « serious game » patrimonial ?

Nous vous souhaitons à toutes et à tous une très bonne lecture et nous vous remercions de votre fidélité.

Sylvie **LELEU-MERVIEL** et Khaldoun **ZREIK**
Rédacteurs en chef

Business intelligence and non-profit organisations. Meaning-making in decision aiding

Intelligence économique et associations à but non lucratif. Fabrication de sens/signification pour l'aide à la décision

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Abstract. Implementing a Business Intelligence approach in non-profit organisations is becoming a burgeoning field of research. In furtherance to this line of study, the situational-semiotics of Mucchielli (2012) made explicit stakeholders' reference points about what constitutes a "meaningful" Business Intelligence process. A Decision Aiding Process structured the different rationalities of stakeholders concerning how a business sector organisation could adopt a Business Intelligence process. To do this, the tried and tested tools of a *SWOT* analysis, *Delphi* technique and *Visual Promothee* software were used to encourage and analyse exchanges with stakeholders. The originality of this study lies in the inclusion of a structured meaning-making framework in a value-based multi-criteria decision aiding process. The findings highlight the advantages of a hybrid solution for the setting-up of a Business Intelligence process within a non-profit organisation. The article is of particular interest to those wishing to adapt practices of major Western industries to less Westernised non-profit organisations.
Keywords. Meaning-making, decision aiding process, business intelligence, situational-semiotics, value.

Résumé. L'étude de l'apport de l'Intelligence Économique au management des associations à but non-lucratif représente un domaine émergent. Dans le but d'intégrer un processus d'Intelligence Économique au sein d'une association au service des entreprises, un Processus d'Aide à la Décision, accolé à la sémiotique-situationnelle de Mucchielli (2012), a été employé. Dans cette optique, les méthodes éprouvées de l'analyse *SWOT*, de la technique *Delphi* et du logiciel *Visual Promothée* ont servi à encourager et à analyser des échanges avec des parties-prenantes. L'originalité de l'étude tient à l'incorporation d'un cadre de fabrication de

sens/signification à un processus d'aide à la décision multicritère portant sur des valeurs organisationnelles. Le résultat de l'étude souligne l'apport d'une solution hybride pour l'adoption d'un processus d'Intelligence Économique au sein du service d'informations de l'association. L'article porte un intérêt particulier pour ceux cherchant à adapter des pratiques des grandes industries occidentales aux associations à but non lucratif dans un univers moins occidentalisé.
Mots-clés. Fabrication de sens, sémiotique-situationnelle, intelligence économique, processus d'aide à la décision (PAD), valeur.

1 Introduction

Non-profit organisations increasingly represent a key element of modern society. With the retreat of State services, grassroots non-profit organisations find themselves having to offer more and more services, such as in medicine, social services and in the business world. This means that non-profit organisations, despite their limited resources, need different management processes to provide more services. One response to the growing demands made on non-profit organisations is the Business Intelligence pathway.

Our study examines how to implement a Business Intelligence process within a business sector non-profit organisation in the Palestinian territories. To that end, the article begins with the research setting outlining the constraints of the study. Then follows a literature review of Business Intelligence in order to identify current trends and gaps in the domain. This leads to the research statement, followed by the research framework based on a value-based multi-criteria decision aiding organisational process coupled to the situational-semiotics of Alex Mucchielli (2012). In the final section, the recommendation of the study and its theoretical implications are discussed.

2 Research context

2.1 Research setting

The study is anchored in the precarious socio-political context of the Palestinian territories. The upshot of this is that it is particularly challenging for decision-makers to anticipate events and their consequences. Business decisions are, thus, subject to incertitude and the unforeseen. In this context, a number of non-profit organisations[1] exist within the territories, one of which is the business sector non-profit organisation, called the *Union of Stone and Marble industry* (USM).

According to the *Palestinian Central Bureau of Statistics* (PCBS, 2012) Small and Medium Sized Enterprises represent more than 90% of the economy of the territory. Of this, the ancestral stone and marble Small and Medium Sized Enterprises represent more than 90% of registered companies. In fact, the stone and marble industry creates more than 20 000 jobs and contributes up to one third of exports (Hushaysh, 2019 : 44). This makes the industry the most important

[1] No private person controls a non-profit organisation, or owns shares or interests in its assets. Profits of a non-profit organisation must be invested back into its activities that must directly benefit society. A board of directors ensures a non-profit organisation fulfils its mission. Types of non-profit organisations include membership groups (like business associations, veteran and fraternal groups), charities, advocacy groups, social and recreation groups.

productive sector of the Palestinian territories (PCBS, 2012). This being said, the vicissitudes of the political context, a fragile economy and the conservatism of Palestinian society inhibit rapid or major change in professional practices. This can be problematic in view of the high competition in local and international markets of the stone and marble industry, notably in Jordan, India, China, Egypt and Turkey (Ihshiesh & Fallah, 2018).

In this context, the Union of Stone and Marble organisation[2] is an independent, non-governmental single sector membership-based non-profit organisation. The main goals of the Organisation are to offer timely information about the stone and marble industry, help members penetrate potential markets, build-up members' professional skills, lobby the central Palestinian authority and international bodies, obtain projects and programs to promote exports, and organise participation in international events (Labour, Hushaysh & Crévits, 2017). To that end, the information services of the Organisation disseminates data to its members through meetings, a web site, newsletters, and sms.

The Organisation gathers data from sources, such as the central governing body, local and international agencies. However, neither the data gathering nor its interpretation are conducted systematically. There is also no regular feedback about the information services of the Organisation from its users (Labour, Hushaysh & Crévits, 2017). This situation can be explained by limited human, material and financial resources of the non-profit Organisation. For example, the executive team is made up mostly of new graduates with limited professional experience. Added to this, the principal revenue of the Organisation is its relatively modest membership fees.

In 2017, a questionnaire-based study established that most members of the Organisation felt it was behind many other non-profit organisations as a source of business information (Labour, Hushaysh & Crévits, 2017). Members indicated they were ready to pay additional fees if the Organisation provided value-added business information (e.g. new business trends, upcoming events, business opportunities and threats). The results also showed that the Organisation did not use appropriate tools when communicating with its members. One way of responding to this situation would to be to introduce a "meaningful" Business intelligence process within the Organisation. If this were to be so, what would be the benefits and drawbacks of such a "process"[3]?

2.2 Business intelligence

Richard Miller appears to the first to have coined the term "business intelligence" in his 1865 work, *Cyclopædia of Commercial and Business Anecdotes* (Limp, 2019) to describe how a successful banker of the time analysed data rather than solely relying on his intuition. More than a century later, Luhn (1958 : 314), an IBM computer scientist, was one of the first to describe a "Business Intelligence system" as "data-processing machines for auto-abstracting and auto-encoding documents" to help organisational decision-making. Today, Constantiou, Shollo & Vendelø (2019) argue for a less technocratic approach in business strategic decision-making in their evocative article "*Mobilizing intuitive judgement during organisational decision-making: when Business Intelligence is not the only thing that matters*".

[2] For ease of reading, the term "Union of Stone and Marble industry" will shortened to the "Organisation" (with a capital "O").

[3] By "process" is meant interventions that modify the positions of social actors, and their actions, as well as the form of perceived phenomena relative to situated meaning-making reference points (Mucchielli, 2006 : 152-153).

Nevertheless, a literature review of the Business Intelligence field shows a persistant technocentric focus (Ain, *et al.,* 2019, Constantiou, *et al.*, 2019). This focus is no truer than in France where Business Intelligence can be translated as "*Informatique Décisionnelle*", *i.e.* Decisional informatics (*Le BigData*, 2019). Decisional informatics can be linked to the established domains of *Operations Research* and *Decision Aiding* (RO&AD) with their strong algorithmic orientation.

Informatics, as a domain of Business Intelligence, can be described as the representation, processing, and communication of information in natural and engineered systems in its "computational, cognitive and social aspects (…) whether by organisms or artefacts" (University of Edinburgh, 2019). This is in line with Gray (2003 in Olszak & Ziemba, 2007 : 137) who contends that Business Intelligence can also draw on soft (cognitive and social) data. Olszak & Ziemba (2007 : 145-146) underline how it is critical for Business Intelligence to take on board the cognitive and social aspects of an organisation. In this sense, Business Intelligence can be seen as technologies, applications, and processes for gathering, storing, accessing, retrieving and analysing (soft- and hard-) data to help users make rational decisions.

Despite calls for a broader view (Constantiou, Shollo & Vendelø, 2019), there remains few studies that take into account the dynamics of organisational and environmental factors in Business Intelligence (Fink *et al.*, 2017 : 40). For example, Shollo (2013 : 226) asserts that Business Intelligence underestimates, if not ignores, organisational cultures and decision-making "philosophies". A step towards a broader view of Business Intelligence can be found in the French social sciences domain of Information and Communication Sciences. For example, the problem-resolution model of Bouaka & David (2003: 7) formalises a decision maker's characteristics linked to organisational and environmental parameters of a given problem. Libaert and Moinet (2012: 7, citing Massé & Thibault, 2001 : 274) advocate a Business Intelligence approach that integrates human factors in organisations by providing purposeful meaning to actions and shared empowering interactions.

In this context, the founding work of Herbert Simon (1960/1977 : 64-65) highlighted two broad types of organisational decision-making processes. On the one hand, "non-programmed" (unstructured) decisions deal with problem resolution in uncertain and ambiguous situations. On the face of it, such decisions invariably fall in the province of top management, notably when setting overall objectives and deciding how to monitor their deployment. On the other hand, "programmed" (structured) decisions refer to more operational actions of middle and line management dealing with largely predefined objectives of day-to-day actions. For middle management, Business Intelligence can provide a basis for decision-making, for example, in marketing, sales, finance, capital management aligned to overall objectives. While for line managers, Business Intelligence can be handy for *ad hoc* analyses and being informed about ongoing operations and projections (Olszak & Ziemba, 2007 : 137-138).

Shollo (2013), at the *Copehangen Business School*, highlights a number of blind spots in current Business Intelligence. These include the fact that many Business Intelligence scholars go no further than a Rational Choice theory approach. Rational Choice Theory argues that the less there is uncertainty and ambiguity in a decision-making process, the more decision-makers make "better" decisions (*e.g.* Ain *et a*l., 2019 : 1, David & Njock, 2017 : 1, Bouyssou *et al.* 2006 : 1). This reasoning is predicated on the arguable premise that "rationality" and "better" decision-making always go hand in hand (Shollo, 2013 : 47, 213).

In this study, the term Business Intelligence refers to a continuous activity of gathering, processing and analysing soft- and hard-data that enhances the objectives and dynamics of a business-oriented structure. In this case, one key objective of the Union of Stone and Marble organisation, like many non-profit organisations, is accountability to its members and sponsors. One practical aspect of this accountability is setting up Critical Success Factors to ensure the Organisation achieves its declared mission (Wadi & Zarai, 2013). For that purpose, Farrokhi (2017) classified Business Intelligence Critical Success Factors into two broad categories. The first category is that of an empowering organisational culture consisting of managerial knowledge of Information Technology, management support, a clear decision-making structure, goal alignment, resource allocation, user participation, balanced and skilled project teams, and agile project management. The second category covers technically related aspects such as system and data quality, reliable back-end system, metadata management and agile methods and techniques. The end result is that Business Intelligence requires significant human, material and financial resources (Farrokhi 2017, Hartley & Seymour 2015). In sum, if the Union of Stone and Marble industry organisation were to invest in a Business Intelligence process it would need deliberate planning and significant resources.

2.3 Research statement

Concerning the *Research setting* (above), particular note was taken of the underperformance of the information services of the Organisation situated in a precarious business context. Yeow (2006), an international consultant in information services, points out: "Information is one of the most important services that enterprises expect from chambers of commerce and industry as well as from business sector associations. This is especially true for small and medium enterprises since their in-house search capabilities are often weak and undeveloped" (Yeow, 2006: 1).

All in all, putting in place a Business Intelligence process implies major organisational change[4]. This can be immensely disruptive, especially if its effects are underestimated. Ashkenas (2013), a change management consultant, highlights how "most studies still show a 60-70% failure rate for organisational change projects – a statistic that has stayed constant from the 1970's to the present". Gilbert, *et al.* (2017 : 37), consultants in change management, attribute failures in organisational change, principally, to top-management exclusively deciding what and how to change. In so doing, top-management underestimates resistance to change by brushing off collective and individual dynamics. This can lead to unclear objectives, and side-lining the preoccupations of middle management and operational teams. Bearing this in mind, our study was based on three premises.

Premise #1: Leaders of organisational change need to understand *how stakeholders perceive the need for change.*

Alternatives selected through a process that constructively involves the stakeholders are likely to be seen as fairer and more reasonable than those same alternatives would be if selected by (top management) with little stakeholder involvement (Keeney, 1992 : 219).

In our study, a structured decision aiding process guided the understanding of the perceptions of stakeholders (board members, staff, members, and external

[4] It appears that the ideogram for "change" in Chinese is made up to two revealing terms "danger" and "opportunity", highlighting the inherent tensions within a change process.

partners) directly affected by a Business Intelligence process within the Organisation.

Premise #2: Successful change depends, inevitably, on the *"values"*[5] *of stakeholders*.

However, in order to limit any excessive biases of pre-dominating values, Roy (2000 : 8), father of European multi-criteria decision aiding, states that: (..) multicriteria analysis avoids to prejudge any aggregation logic, nor does it favour the value system of any individual stakeholders. The criterion family should form a framework for structuring dialogue and debate. This framework seeks to give the most fundamental subjective aspects their due in order to foster a confrontation among different rationalities (Roy, 2000 : 8).

Our study accordingly structured a series of dialogues and debates with stakeholders based on a meaning-making[6] process (with its "subjective aspects", Roy 2000 : 8, above). To that end, the situational-semiotics analysis of Mucchielli (2012) explicates key meaning-making reference points of social actors (see Table 4, below).

Premise #3: Leleu-Merviel (2018) and Jeanneret (2009), French Information and Communication Sciences experts, espouse the idea that *social knowledge* ("savoir", in the original French) *circulates* in such a way that it transforms and instrumentalises itself through social practices. Consequently, a researcher "does not have the freedom to decide alone the meaning and informational value of a social practice" (Jeanneret, 2009 : 83).

In our study, this premise provided the rationale for our action-research (see below) based on understanding the social practices of grassroots actors.

In view of the *Research setting* (see above), our research statement is as follows: *How can the* Union of Stone and Marble industry *organisation encourage meaningful exchanges among stakeholders about improving the Organisation's information services in taking into account the likely upheavals of a Business Intelligence process?*

3 Data collection and interpretation

3.1 Research framework

In view of the *Research setting* and *Research statement* (above), an *action-research* approach was adopted. The "action" element, of our action-research, can be found in dialogues and debates about personal and collective practices with grassroots actors about improving the information services of the Organisation. In this case,

[5] "Values are what we care about. As such values should be the driving force for our decision making" (Keeney, 1992 : 2). Kluckholm *et al.* (1951 : 396) offer a more precise idea of the term; "a value is not just a preference but is a preference which is felt and/or considered to be justified".

[6] "Meaning" emerges, in a non-determinist way, by the way it compares and evaluates a phenomena from a given viewpoint (Mucchielli, 2012 : 33). In this light, a meaning-making process links a perceived phenomena to a person's context of reference (Mucchielli, 2012 : 33, 61). A "context of reference" refers to background values, norms, stakes/issues and positions (Mucchielli, 2012 : 80). It is, thus, through appropriated socio-cultural norms and values that an individual's context of reference can "decrypt" a phenomena embedded in a perceived "situation" (Mucchielli, 2012 : 10, 14-16).

the actions constituted a way of understanding how stakeholders perceive the need, or not, for organisational change (see premise #1, above). The "research" element, of our action-research, refers to coherent and transparent data collection and analysis of the circulation of knowledge (see premise #3, above) regarding the Organisation.

The focus is on how different value systems would respond to organisational change in a given situation (see premise #2, above). In this our research differs from the creation of generalizable "scientific" knowledge based, for example, on parametric statistics or artificial laboratory conditions. In this case, the first author of this paper conducted the data collection in the Palestinian territories from 2014 to 2019. The aim was to grasp stakeholders' values, and their respective rationalities, regarding organisational change. To that end, tools and techniques, such as the *Delphi* and Decision Aiding Process approach, traditionally used in major Western industries were adapted to a non-profit organisation for Small and Medium Enterprises in the Palestinian territories.

A benefit of such an action-research is that it affords in-depth knowledge about a specific situation. One main drawback of this type of research is that the presence of an embedded researcher in the field can distort the behaviour of other actors in the situation. This is notably true when the researcher is also the other actors' CEO. This could create an insoluble conflict of interest, if it were not for the presence of a set research method and two other researchers on the research team to ensure a critical research distance. To that end, the well-known Planning-Acting-Observing-Reflecting method of Lewin (1946) was adapted in order to limit field researcher bias. The two other researchers, and co-authors of this paper, actively contributed to guiding the transformative circulation of social knowledge (see premise #3, above) and how the data were collected and analysed.

The study adopted a qualitative exploratory approach that complied to the core principle of validity[7] of avoiding, as much as possible, false or distorted accounts when mapping ideas, and statements about a shared reality and what appears to be occurring in that social reality (Neuman, 2014 : 218). The advantage of a qualitative exploratory approach is its flexibility in exploring under-researched domains, like ours. Its shortcoming is that the parametric statistics validity and reliability of the data are limited due to the limited corpus of the research. With this in mind, it was judged important to employ tried and tested tools. The tools provided a trace of the research process, a structure to data collection procedures and the circulation of knowledge, and face validity to the stakeholders.

From an Information and Communication Sciences perspective, our research tools were chosen not only for their acknowledged, albeit perfectible, effectiveness but also for their socio-cultural features[8]. To paraphrase Shollo (2013 : 226), it is by social practices that tools become devices of collaboration, reflection and dialogue, and not mere purveyors of imperious decisions. The tools carry with them personal and social knowledge that generate affordances to "actors-in-situation" (Mucchielli, 2012 : 132). These affordances convey "incorporated significations" forged through social interactions within a shared world (Mucchielli, 2012 : 133). In this case, it is

[7] i.e. "how well we measure social reality using our constructs about it" (Neuman, 2014 : 212).

[8] A tool, and its techniques, is not culturally or cognitively neutral. Brossard (2009 : 39), commenting on the founding ideas of social psychologist Vygotsky, affirms that a "tool" is a depository of prior activities of a group that structured its activities to give access to the values of the group.

through the affordances of the *SWOT* analysis, *Delphi* technique (Avella, 2016) and graphics of *Visual Promethee* (see below) that our study mapped out what stakeholders considered as meaningful. Indeed, meaning-making is of interest not only to the Information and Communication Sciences, but also to the domain of Decision Aiding, as Roy (2000) testifies. "(…) the notion of relative importance of criteria has meaning only relative to a stakeholder whose value system it reflects, this notion is necessarily infused with a measure of subjectivity. In most cases, this means that any search for a perfectly objective value or for a procedure allowing us to compare objectively any given action with any other, is illusory" (Roy, 2000 : 8).

In this way the quote of Roy (2000: 8, above) links the notion of value system to meaning-making. It also explains our reason for incorporating situational-semiotics (see below) into our Decisional Aiding Process structure. Ashkenas (2013) argues that such a structure should include definitions, approaches and checklists in order to reduce misunderstandings and enhance dialogue. Echoing this point of view, in a multi-criteria decision aiding context, Bouyssou *et al.* (2006 : 21) argue for a framework with formalised techniques, rules and a set language in order to reduce the need for heuristics and intuition.

Our research structure sought to facilitate the participation of the principal actors involved in the circulation of knowledge (Leleu-Merviel, 2018) concerning the Organisation. In this light, we adopted a Decision Aiding Process approach (Crévits, 2011) with its four interacting and non-linear dimensions: (1) Defining the situation-problem, (2) Formulating the problem, (3) Evaluating alternative solutions, and (4) Recommendations. The unifying element of these four non-linear dimensions is its praxeologic postulate that humans are able to engage in purposive decision-making based on meaningful preferences (expressing a, more or less, shared value system).

The "Defining the situation-problem" dimension (Crévits & Labour, 2012: 68) of our Decision Aiding Process approach included the "Planning-Acting-Observing" aspects of our action-research. To this end, a SWOT (Strengths, Weaknesses, Opportunity, Threats) technique was used to grasp the readiness of the Organisation – for Business Intelligence implementation – in terms of what stakeholders perceive as meaningful (Hushaysh, 2019 : 134-136).

In the "Formulating the problem" dimension (Crévits & Labour, 2012 : 69) of our Decision Aiding Process approach, a panel of stakeholders used the *Delphi* process to establish a consensus about what they value in a Business Intelligence process. For Avella (2016) the *Delphi* process systematically constructs collective consensus[9] when there is limited data on a topic, as is our case. The consensus provided vital information to the "evaluation model" dimension of our Decision Aiding Process approach (see below). However, as Aigbavboa (2015) points out a *Delphi* "consensus" is difficult to establish as there is no agreement at what precise level such a "consensus" is reached. Some, like Avella (2016), argue that a consensus occurs at the 55%, or more, level of agreement. Others, such as Vernon (2009), state that the level should be at least 70%. Being mindful of the debate, we adopted a 66% consensus threshold.

We selected a panel of 12[10] from those who had more than 5 years of work experience and knew the services of the Organisation and/or were presently a

[9] This refers to the concept of "criterion family" that seeks to reflect stakeholders' commitments by assembling data that are sufficiently exhaustive, cohesive, non-redundant and meaningful (see Roy, 2000 : 7).

[10] Given limited resources, a 12-person panel was the logistic limit of the study.

senior member or board member of the Organisation, or a Small and Medium Enterprise representative, or a member of the Palestine Stone and Marble Centre of the Palestine Polytechnic University, or an expert in data processing. The research team selected 3 Union of Stone and Marble industry board of directors, 3 members of USM staff, 2 academics from the Palestine Polytechnic University, 3 Small and Medium Enterprise members, and 1 information system expert (Hushaysh, 2019 : 171-177).

A *Delphi* process needs at least two rounds with the same panel (Avella, 2016 ; Aigbavboa, 2015). In our study, we conducted three rounds. Due to their unavailability, it was not possible to convene the panel for additional *Delphi* rounds. In keeping with common practice, Round #1 presented the panel with a summary of a literature review on Business Intelligence with three alternative solutions for its implementation (drawn from Table 1, below). The panel debated what was presented, while the Union of Stone and Marble industry organisation staff took notes of what was said. In Round #2, the panel received a written shortlist of Critical Success Factors established during Round #1. The panel was then asked to establish what they valued as (a) evaluation criteria, (b) weights and (c) thresholds regarding the three alternative solutions to implementing a Business Intelligence process. In Round #3, the panel worked out precise weightings for each criterion that would reflect the values of the Organisation.

The "Evaluating alternative solutions" dimension (Crévits & Labour, 2012 : 70) of our Decision Aiding Process approach used the *Visual Promethee* software to outrank[11] alternative solutions mathematically based on the weightings, thresholds, measurement scale provided by the *Delphi* panel. Halouani *et al.* (2009 : 841) point out that *Promothee* is adapted for multi-criteria decision aiding, notably where decision makers express different points of view about alternative solutions and their knowledge of them. This approach fits in with Keeney (1992 : 150), for whom value-focused thinking implies helping stakeholders express their "values verbally or graphically so that you can represent them mathematically".

The "Recommendation" dimension (Crévits & Labour, 2012 : 70) of our Decision Aiding Process approach (below) was framed with the insights of the situational-semiotics approach of Mucchielli (2012 : 5, 213-214). Before discussing the recommendation, it would be useful to present the results of the study.

3.2 Results

Data visualisations depend on socio-cognitive tools that frame meaning-making practices (see footnote 8, above). These visualisations can lend themselves to a semiotic inspired analysis, but this is beyond the scope of this article. Given this limit, we present different forms of visualisations of the soft- and hard data (Leleu-Merviel, 2018) from the action-research. The visualisation starts with Table 1 (below) that offers a synoptic view of the exchanges with the Organisation's staff (see "Defining the situation-problem", above). The dotted lines in Table 1 (below) indicate interactions among the quadrants.

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[11] Following a Rational Choice theory logic, the *Promethee* analysis compares pair-wise actions on each criterion based on a decision-maker's declared preferences. This gives "local scores" that are then aggregated into "global scores". The process results in partial pre-order rank (PROMETHEE I) or a complete pre-order rank (PROMETHEE II), see Hushaysh (2019) and Lopesa *et al.* (2018 : 3) for further details.

Internal strengths	**Internal weaknesses**
- diversity of services - strong voice for advocacy due to the brand name "Union of Stone and Marble" organisation - effective representative of the industry - CEO's actions draw in new members	- limited resources in staff and finance - outdated procedures, low quality services - weak data gathering and processing, low added-value data for members, - weak communication channels with members - some board members and regional committees under-perform - executive team is not always effective - CEO unavailable for high value tasks
External opportunities	**External threats**
- resources for developing staff skills - Japanese donor for potential projects - networking with international institutions and the Palestinian diaspora (embassies, commercial attachés, organisations, etc.) - alliances with local partners	- political instability - competition from non-profit organisations like the Chamber of Commerce, Palestine Trade Centre - lack of support through public industrial policies and from the central Palestinian authority

Table 1. *Staff analysis of the Union of Stone and Marble industry organisation*

Table 1 (above) highlights the perceived internal and external resources and limits of the Organisation. On the one hand, the shortcomings could drive away members from the Organisation unless it upgraded its services and/or neutralised its limits. On the other hand, the resources of the Organisation could reinforce its market position. This could include bolstering its good reputation for advocacy, notably in creating alliances with local partners, like the Palestine Polytechnic University and the Palestine Stone and Marble Centre[12], and other experts. For example, the Palestine Stone and Marble Centre could offer a transfer of technology and skills to local stone and marble small and medium enterprises. Another opportunity would be to ask members to pay additional fees for added-value information services. This extra funding would allow the hiring of experienced staff and/or outsourcing the data analysis. With this in mind, and based on the literature survey, namely on Business Intelligence, and the CEO's 10 years of experience in the Union of Stone and Marble industry, the research team synthesized the data of Table 1 (above) into three broad alternative solutions: (1) the staff of the Organisation performs all its Business Intelligence tasks without any outside help, (2) all Business Intelligence tasks are outsourced and (3) the Organisation works with external partners.

In the "Formulating the problem" dimension of our Decision Aiding Process approach, the three alternative solutions (above) were shared with the *Delphi* panel. It was asked of them to provide appropriate criteria, weightings and thresholds for

[12] The Palestine Stone and Marble Centre is a non-profit organisation specialising in business information and technology transfer (PSMC, 2018).

each of the three alternatives. The panel prioritised three criteria. Criterion 1 was the *Human factor* regarding staff upskilling, notably about data analysis skills, and hiring experienced staff in data analysis. This criterion was evaluated on a five-point Likert scale. Criterion 2 was *Information Technology* (IT) infrastructure. This included hard- and software upgrading and data analysis. The criterion was evaluated on a five-point Likert scale. Criterion 3 was the *financial cost* of Business Intelligence. This took into account how investments would fare with a projected return on investment from a cost-benefit point of view. While it was technically possible to measure this criterion quantitatively, for ease of use for stakeholders it was decided to resort to a five-point Likert scale.

With regard to the Business Intelligence process implementation alternatives, Table 2 (below) summarises the work of the *Delphi* panel in what it considered as appropriate weights, measurement scales, and preference/indifference thresholds.

Criterion	Weight	Measurement scale	Preference threshold	Indifference threshold
Human Factors	25%	5-point Likert	0.50 <	0.50 >
IT infrastructure	25%	5-point Likert	0.50 <	0.25 >
Financial cost	50%	5-point Likert	1 <	0.25 >

Table 2. Delphi-*panel results of stakeholders' priorities*

The panel accorded the highest weight of 50%, with a maximum *Preference Threshold* score of 1 (full preference) to the *Cost* criterion, along with a low *Indifference threshold* score of 0.25 (Table 2, above). The gap between the *Preference* and *Indifference* thresholds standout when compared to the other two criteria. This indicates the importance given to the *Cost* criterion. The panel placed the *Human Factors* and *Information Technology (IT)* infrastructure criteria on par when it comes to the *Preference*[13] *threshold*. There was a notable difference, however, between *Human Factors* and *Information Technology infrastructure* concerning the *Indifference*[14] *thresholds*. The *Information Technology infrastructure* is twice as low (0.25) than the *Human Factors* threshold (0.50). This indicates that the Information Technology infrastructure indifference threshold is considered as more important than *Human Factors* (probably because staff can be replaced with ease because local unemployment is high).

For the "Evaluating alternative solutions" dimension of our Decision Aiding Process approach, the research team developed seven potential options based on

[13] *i.e.* a *Preference threshold* distinguishes situations of "weak" (hesitating) from "strict" (affirmed) preferences. It does this by setting a cut-off point, above which a strict preference is established.

[14] *i.e.* an *Indifference threshold* distinguishes situations of "indifferent" (of little value) from "weak" (hesitating) preferences. It does this by a defining a cut-off point, under which an indifferent preference is established.

feedback from the *Delphi* panel (Hushaysh, 2019 : 177-178). The options are: the *Union of Stone and Marble industry organisation* staff does all the Business Intelligence tasks by itself (**USM**), Delegation of all Business Intelligence tasks to the Palestine Stone and Marble Centre (**PSMC**), Delegation of all Business Intelligence tasks to a consultant (**Expert**), Alliance between the Organisation and the Palestine Stone and Marble Centre (**USM+PSMC**), Alliance between the Organisation and a consultant (**USM+Expert**), Delegation given to the Palestine Stone and Marble Centre and a consultant (**PSMC+Expert**), and Alliance with the Organisation, Palestine Stone and Marble Centre and a consultant **(ALL)**. To evaluate these seven options, the *Delphi* panel had generated criteria, weightings and thresholds (Table 2, above) for data processing use by the *Visual Promethee* software.

Rank	Alternative	Phi-[15]	Pi+[16]	Phi[17]
1	All	0,2500	0,6667	0,4167
2	PSC+ Expert	0,1667	0,5000	0,3333
3	USM	0,2083	0,2917	0,0833
4	USM+PSC	0,2500	0,2083	– 0,0417
5	USM+Expert	0,2500	0,2083	– 0,0417
6	SC	0,3333	0,0833	– 0,2500
7	Expert	0,5417	0,0417	– 0,5000

Table 3. Promothee *analysis of Business Intelligence implementation options*

Table 3 (above) indicates the numerical values of potential options ranking from the best to the worst. On the one hand, the **All** option had the highest Phi *net rank* of 0.4167. Indeed, the Union of Stone and Marble industry organisation, Palestine Stone and Marble Centre and an external consultant appeared to be the most suitable option to accomplish data analyses with the Organisation. On the other hand, the Stone and Marble Centre (**SC**) and the expert (**Expert**) options, as independent entities, both occupy the bottom of the list. This indicates that the *Delphi* panel felt external entities could not carry out, by themselves, the mission.

From a different angle, Figure 1 (below) of the *Promethee network* graph presents options as a series of nodes and arrows to indicate weak and strict preferences. The longer the arrow, the further the distance preference visualised between options. For example, the **All** option portrays a distant link to the Stone and Marble Centre (**SC**) and the expert (**Expert**) options. One can infer from this, that the panel members judged the presence of the Union of Stone and Marble industry organisation as very important in carrying out its data analyses tasks. Whereas, completely outsourcing the data analyses tasks does not seem desirable, no doubt, due to the fact that the *Delphi* panel felt that the Organisation was best able to anticipate its own members' changing needs.

[15] *i.e.* an input/negative ranking preference flow indicates how all the other options outrank a given option. The lower its Phi–, the better is the given option.

[16] *i.e.* an output/positive ranking preference flow indicates how a given option outranks all the other options. The higher its Phi+, the better is the given option.

[17] *i.e.* the difference between Phi+ and Phi–. The higher Phi (the net flow), the better is the option.

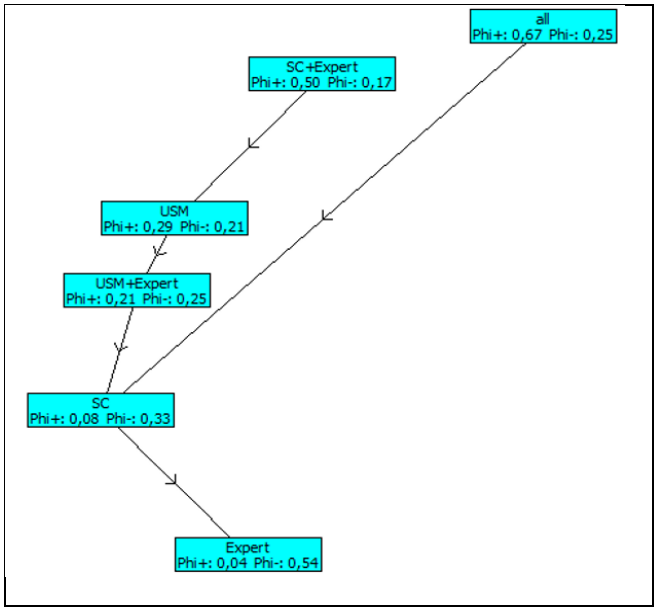

Figure 1. Promethee *network data analysis of Business Intelligence options*

The *Promethee rainbow* (Figure 2, below) is a disaggregated visualisation of a *Promethee II* complete ranking procedure of options presented in the form of spatial volumes of preferences. In this light, Figure 2 (below) ranks alternatives according to the effect on each criterion from left to right. The most preferred option is placed on the far-left of the figure while the least preferred option is found on the far-right, for example, we can see the disapproval for an outside, independent expert to analyse the data.

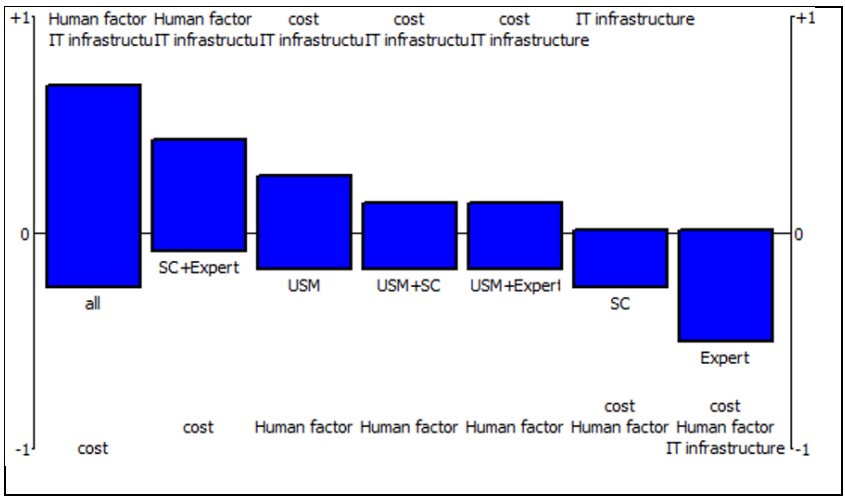

Figure 2. Promethee *rainbow data analysis of Business Intelligence options*

On the one hand, the **All** option is visually represented as a positive space concerning the *Human Factor* and *Information Technology* infrastructure criteria (Figure 2, above). It would seem that the Union of Stone and Marble industry organisation, Palestine Stone and Marble Centre and local experts complement each other's skills. On the other hand, the **All** option displays a negative space for the *Cost* criterion. This can be explained by the fact that the outsourcing to **PSMC** and an **Expert** require significant additional finance. Concerning the **Expert** option, it occupies the bottom place for all three criteria. In sum, Table 3, Figures 1 and 2 map out just how the **All** option would be the most satisfactory way to improve the information services of the Organisation.

3.3 Discussion

Transforming an organisation is no mean feat. The failure rate of organisational change is notoriously high (see above). In this light, the challenge of our study was to encourage intra-organisational dialogue about improving its information services. To that end, the recommendations of our Decision Aiding Process approach present the research findings based on the different stakeholders' apparent meaning-making processes (see tables 4 and 5, below). A first step, in making our recommendations meaningful, was to recognize that formal data visualisations graphics (above) have their limits. They may not be meaningful to all the stakeholders. This led to creating different framings of the findings.

Tailoring recommendations

The experimental work of Tversky & Kahneman (1981: 453-454) underlined the critical importance of how a message is "framed". For example, a medical patient can take different decisions depending on whether a doctor frames medical options positively (*e.g.* highlighting hope giving elements) or negatively (*e.g.* highlighting negative elements). On a different level, Bouyssou *et al.* (2006) consider the framing of recommendations under three conditions. First, the recommendation needs to be technically feasible. Second, the "client" (*i.e.* the person requesting help from an expert about taking a decision) needs to grasp the expert's recommendation in a practical hands-on way. Third, the recommendation needs to be (legally, ethically, …) legitimate. For Labour (2016: 586) these three conditions overlook the role of stakeholders' perceptions of what they consider as acceptable changes – and the likely resistance it could create – within an organisation, crucially considered as a dynamic and open system[18].

Within the Organisation it was possible to differentiate three groups of stakeholders. These were the Board of Directors, the information services staff and the paying members of the Organisation. From an informational-communicational point of view, although each group has its own preoccupations, they nevertheless share a broader socio-cultural value system of the Palestinian context. According to Abu Hanieh *et al.* (2013) traditional top-down family businesses show similar characteristic to those of major Palestinian firms. For example, Both Jaber (2015) and Amleh (2014) concur that Palestinian culture highly rates its ancestral traditions. Hushaysh (2019: 9), the Palestinian CEO of the Organisation, agrees with Amleh (2014) and Jaber (2015) who note that males (as a visible social group) occupy top

[18] A dynamic open system represents "wholes organised on multiple level. Each organised whole is defined by its interactions with other entities as well as its environment. (…) Organised wholes can adopt different types of control modes or management behaviour" (Sundström & Hollnagel, 2010 : 242, 243).

(social and corporate) positions, are more employed and better paid. Palestinian culture encourages the taking care of their particular social group (Hushaysh 2019, Jaber 2015, Amleh, 2014). Jaber (2015) asserts that within these groups (e.g. family) there is a notable power hierarchy based of obedience and respect of "seniors" (in age, hierarchical rank, social role, …). For Hushaysh (2019: 9) this creates a top-down business style that limits grassroots employees making decision even when this may be needed. Palestinian culture also tends to avoid uncertainty (and its risks) especially in the work place (Hofstede 2015, Jaber 2015). Hushaysh (2019: 34) reinforces this point by stating that employees tend to prefer familiar, even "monotonous", work routines rather than unfamiliar (habit changing) initiatives, even if they be more "creative". Knowing this, how can one customise recommendations to inform and reassure different "types" of stakeholders within an organisation? One way of doing is to turn to the situational-semiotics of Mucchielli (2012). "Situational-semiotics reaffirms that meaning is always "meaning in situation". There would be no meaning without the linking-up of things" (Mucchielli, 2012 : 219[19]).

Situational-semiotics conceives meaning-making as a linking-up process of five reference points in a given "situation" (Mucchielli, 2012: 33, 61). The interdependent reference points can be encapsulated in five basic questions: What are the *gains* and *losses* at stake and for whom? What *norms* are involved? What *core value* comes into play? What is the main *feature* of interpersonal rapports? and What social *positions* are affected? (adapted from Mucchielli[20], 2012 : 188). With this frame of reference, a researcher can grasp how "actors-in-situation" (Mucchielli, 2012 : 213) "contextualise"[21] options when deciding whether, or not, to introduce them in a given situation. Table 4 (below) summarily categorises what stakeholders, of the Organisation, appear to consider as meaningful reference points. This approach can provide guiding elements when framing recommendations.

USM	Gains/Losses	Norm	Core value	Rapport	Position
Board of Directors	minimising costs	policy making	USM brand	top-down	leadership
Information services Staff	keeping their job	implementing policy	esteem from hierarchy	transactional	specialist
Members	getting value for money	using services	trust in services	being understood	client

Table 4. *Stakeholders' meaning-making reference points*

Concerning the communicational framing for the *Board of directors* (Stakeholder group 1), the recommendation emphasised how an alliance with external partners

[19] The authors of the study translated the text from the original French: *La sémiotique situationnelle réaffirme que le sens est toujours "sens en situation", qu'il ne saurait y avoir de sens sans mise en relations.*

[20] If we assume that the five reference points do not have the same weight/importance on an individual's actions, Mucchielli (2012) does not offer any indication of how to determine their weightings.

[21] *i.e.* the automatic and intuitive rallying of mutual social and cultural values and norms (Mucchielli, 2012 : 10).

would reduce costs. In addition, much needed revenue could be raised if members pay extra fees for added-value data analysis. A recommended alliance with external partners could enhance the brand name of the Organisation by extending its network. The recommendation also called for progressively working towards the Organisation running its own Business Intelligence process with minimal outside help. The directors were also informed that their top-down rapport with others may have to be adjusted to the unforeseen nature of transforming the Organisation.

To help get the message across, a tripod structure – hosting two overlapping triangles – was created (see figures 3 and 4, below). Its aim was essentially communicational, based on the collected data. A first triangle, on the tripod, indicated the situation "today" and a second triangle projected the situation "tomorrow". This helped stakeholders grasp the gap, and the expected demands, between the two situations.

Figure 3 (below) presents the overall functional "structure" of an organisation *via* a synoptic tripod (adapted from Garrette *et al.*, 2009: 41). The wide-line central axis features the *Specialisation* pole designating the rights and obligations of functional "positions" as an expression of formal "norms" and "values" (cf. Mucchielli, 2012). The left axis represents the *Coordination* pole concerning staff members in their "interpersonal rapports" (cf. Mucchielli, 2012). The right axis of the tripod indicates the *Formalisation* pole relating to procedures and activities that should be made explicit, for example, orally, by writing and/or by algorithms.

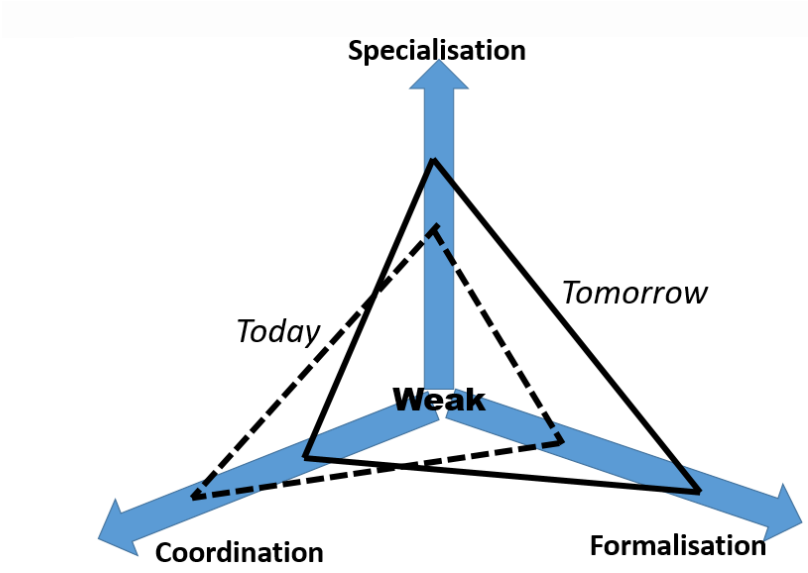

Figure 3. *Re-structuring USM*

Figure 3 (above) indicates the present situation (*Today*, dotted-line triangle), based on a SWOT analysis (see Table 1, above) and the recommended changes (*Tomorrow*, continuous-line triangle) inferred from the *Delphi* process (above). At the heart of the transformation (major structural change) is a progressive upskilling of information services staff. The re-structuring is expected to lead to more staff autonomy whereby incertitude and unforeseen problems can be more easily dealt

with on a day-to-day level. The distances between *Today* and *Tomorrow* constitute areas of change, with attending costs and zones of possible resistance to the re-structuration of the Organisation.

As a way to encourage staff engagement, it is recommended that changes to re-organising day-to-day work practices need to be negotiated with grassroots staff (Stakeholder group 2). Labour (2016: 606) advances that the "organising" of a team can also be schematically portrayed in a tripod mode (see Figure 4, below). The wide-line central axis designates the *Implementation of directives* pole that puts in place the desired "interpersonal rapports" of designated "positions" in terms of estimated gains and losses at stake (Mucchielli, 2012). The left axis displays the *Supervision* pole that monitors on-going policy implementation based on Critical Success Factors. This depends on organisational "norms" and "core values" of the supervision mode (Mucchielli, 2012). Finally, the right axis *Intervention* pole shows the level re-adjustments of directives based on feedback processes.

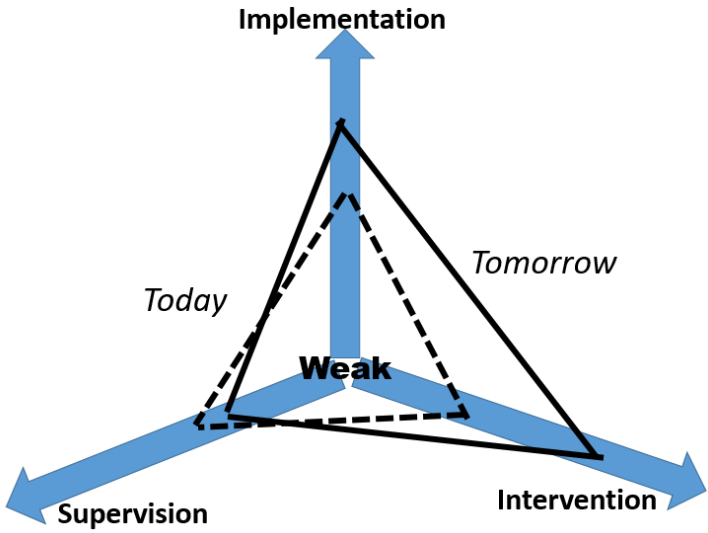

Figure 4. *Re-organising USM*

Figure 4 (above) shows the situation *Today* (dotted-line triangle) and the expected changes *Tomorrow* (continuous-line triangle), inferred from the *Delphi* process (above). The distances between *Today* and *Tomorrow* constitute areas of transformation, with attending costs and zones of possible resistance at grassroots level. Resistance to organisational change may arise from staff having to master new techniques or having to meet the demands of external partners (University staff and the external expert). Changes also include hiring an Information Officer to manage Business Intelligence tasks. Consequently, staff members may need to be reassured that they will not be side-lined, or lose their jobs. To that end, training (coaching, mentoring, guidance) is to be provided.

Paying members of the Union of Stone and Marble industry organisation also need to be informed of the undergoing progress and future plans of the Organisation (Stakeholder group 3). This includes plans about an alliance with the Palestine Stone

and Marble Centre and an expert to improve the information services of the Organisation. Events should also be organised to reinforce trust and confidence in the Organisation as being responsive to members' needs and accountable to them. To that end, one or both of the tripods, above, could be presented to the members.
In the final analysis, our Decision Aiding Process approach successfully generated dialogue and debate among stakeholders. In view of this, one can assert that the study complied to key aspects of *internal validity* (Neuman, 2014: 221), notably that the research structure did not lead to incoherent procedures or findings. As shown in the use of the SWOT and *Delphi* techniques, as well as the three modes of final recommendations, measures were taken to frame the field researcher's presence in the field without inducing major distortions to stakeholders' feedback (*viz.* tables 4 and 5, above). The study also affords sufficient *ecological validity* (Neuman, 2014: 468) in that our action-research approach could be adapted to other similar contexts. This was done by providing categories of analysis expressed through the tables and figures presented in the study.
Immediately after our study, the board directors of the Organisation did not make a final decision about the recommendations for a variety of (financial, logistic, …) reasons, over which the researchers have little control. This begs the question if the success of a decision-aiding recommendation should be judged solely by its short-term results? What importance should be accorded to the medium-term "outcomes"[22] of action-research in relation to its short-term "output", or the apparent lack thereof? The next section seeks to answer this question.

Organisational touchstones

Making use of a Decision Aiding Process approach raises the question about the ultimate touchstone(s) of an organisation. For the sake of simplicity, three major touchstones can be identified. A first touchstone is the *cost-benefit* method. This converts costs and benefits, including the expected impact of outputs and outcomes, into quantified monetary terms and then compares them with previous, or other, outputs for a (self-defined) "collective good" (Sandel, 2009 : 33, 41). Roy (2000: 8) takes issue with this method for resting on "unrealistic hypotheses and proves to be falsified in many decision contexts". A second touchstone is that of *stated intentions* whether they be mathematically rational, or not. Such intentions are founded on (cultural, moral, deontological, *etc.*) precepts (Sandel, 2009 : 111). The approach requires the diligent use of resources and techniques in compliance to stated intentions. These guiding precepts tend to highlight outcomes, even if need be over outputs. A third touchstone is *value-focused thinking* based on stakeholder's preferences (formulated as "objectives") in given situations (Keeney, 1992 : 44-47). Central to *value-focused thinking* are the notions of "meaning" and "reasoning". "Values are identified by the responses to a large number of questions about the meaning of and reasoning for objectives" (Keeney, 1992 : 23). "Value-focused thinking emphasises the "reasons for caring what happens in the situation" "(Keeney, 1992 : 267).
Table 5 (below) cross-matches the three organisational touchstones with the five meaning-making features of the situational-semiotics of Mucchielli (2012).

[22] "Outputs are important products, services, profits, and revenues: the What**.** Outcomes create meanings, relationships, and differences: the Why" (Mills-Scofield, 2012, paragraph 4).

	Gains/Losses	Norm	Core value	Rapport	Position
Cost-benefit	Allocating resources	Quantifying actions	Maximising collective utility	Result oriented	Measuring costs and benefits
Stated intentions	Identifying alternatives	Diligent use of resources	Complying to precepts	Means oriented	Evaluating intentions – resources gap
Value-focussed	Prioritising what stakeholders' care about	Identifying stakeholders' values	Matching precepts to opportunities	Contextualising stakeholders' preferences	Evaluating preferences & opportunities

Table 5. *Meaning-making features and organisational touchstones*

The different levels of an organisation raise the question about the objectives of its decisional processes. Laudon, Laudon & Fimbel (2006 : 463) identify, at least, seven decision-making levels within a firm. For example, it appears that a stock control line-manager makes an average of 365 "decisions" a year, whereas a top manager may take one critical "decision" a year. These two examples show that the nature of the risks and stakes underlying organisational decisions are not all the same. The more "programmed" (routine-based) decisions of a line manager differs from the more "non-programmed" (Simon, 1960/1977 : 64-65) decisions of a top manager. In this sense, an intra-organisational decisional diversity approach takes issue with the overgeneralisation of the Rational Choice theory postulate, often, closely associated with a cost-benefit approach. In fact, contrary to the dogma of Rational Choice theory, uncertainty and ambiguity can be effective driving forces of innovation and organisational resilience[23]. This can explain why those like Constantiou, Shollo & Vendelø (2019) point out that successful top management needs "intuitive judgement". Daniel Goleman (1995/1997) also emphasises this point in his best seller, *Emotional Intelligence. Why it can matter more than IQ* in the business world.

Nonetheless, Business Intelligence practices tend to downplay the effects of human factors, like employee attitudes and corporate cultures, in multi-dimensional decision-making processes. Ain *et al.* (2019 : 8-10) cite research pointing out that failure in Business Intelligence can often be traced back to infrastructural issues, insufficient communication between Information Technology staff and users, the absence of an accessible information culture, inappropriate training, workflow problems and a resistance to change. When speaking of "human factors", two worldviews emerge. According to Klein (2009/2011: 107, citing Reason, 1990) a social actor can be seen as a blend of "hazard" and "heroism" within an organisational system. On the one hand, a *human-as-hazard* approach first blames organisational failures on the carelessness, lack of skills, etc. of users and in so doing it downplays the negative impacts of organisational forces acting on individuals. On the one other hand, a *human-as-hero* approach first attributes failure to the organisation without self-critically questioning their own personal actions. There is no easy recipe how to "blend" these two approaches. One response to this type of conundrums can be found in the works of Information and Communication

[23] *i.e.* an organisation's ability "to adjust successfully to the compounded impact of internal and external events over a significant time period" (Sundström & Hollnagel, 2010: 235).

Sciences researchers, like Libaert & Moinet (2012 : 7, citing Massé & Thibault, 2001 : 274) for whom Business Intelligence needs to take more into account the outcomes of human factors that infuses "meaning" into sustainable actions.

4 Conclusion

The analysis of the Palestinian setting highlighted the high level of incertitude and unforeseen situations for non-profit organisations and businesses. To that end, the central challenge of our study was to ensure that an action-research process encouraged dialogue and debate among stakeholders in order to involve them in the organisational transformation process. To do this, a meaning-based Decision Aiding Process approach structured our action-research. To that end, Mucchielli's situational-semiotics (2012) was employed to clarify what stakeholders appeared to value in their meaning-making processes. This analysis done through exchanges with the staff of the Organisation through a *SWOT* analysis. It indicated the underperformance of the information services of the Organisation. These data provided a base for a three-round, 12-person panel *Delphi* process to establish criteria, weightings and thresholds to improve the Organisation. The *Visual Promothee* software processed different Business Intelligence implementation alternatives based on the findings of the *Delphi* panel. The final results of the study advanced a recommendation based on an alliance with external partners as the most suitable alternative to implement a Business Intelligence process within the Organisation.

The shortcomings of our exploratory action-research include the limited number of stakeholders consulted. To offset such limits, confirmatory studies could include a questionnaire-based survey of the hundreds of members of the Union of Stone and Marble industry organisation, followed by in-depth interviews into members' informational-communicational priorities.

On a more formal level, different multi-criteria decision methods could be compared, such as the ELECTRE (*ELimination and Choice Expressing Reality*) outranking method and AHP (*Analytic Hierarchy Process*), notably in the way they quantify the weights of criteria to ensure "better" decision-making. A corollary to this would be to examine the contributions and the divergences between individual and collective decision-making performances at different organisational levels. In this context, the social sciences, such as the Information and Communication Sciences, have a decisive role to play in integrating social and individual factors in organisational decision aiding.

Acknowledgements

We would like to thank the staff and members of the Union of Stone and Marble industry organisation and its partners who gave their time and energy to participate in the study. We thank the two anonymous reviewers of the article for their insights.

Declaration of interest statement

Igor Crévits and Michel Labour, co-authors of the paper, declare having no financial- or non-financial interest in or affiliation to any organisations regarding the subject matter of the study. Maher Hushaysh, first author of the paper, is the present CEO of the Union of Stone and Marble industry organisation, site of the study. He received no financial- or non-financial incentives for conducting the

research. Research procedures were conducted in accordance with the ethical standards of the University Polytechnic Hauts-de-France.

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