Modeling uncertainty effects in decision taking in buyer-supplier relations

ABSTRACT

Purpose: To develop a model that showsthe different aspects that play a role in decision making in buyer-supplier relations when facing uncertainty.
Methodology: Process steps and relevant aspects were distilled from a broad literature review and evaluated in a Mini-Delphi style workshop.
Findings: An accumulative three-layered model shows *(1)* theassumed *decision flow* of the decision maker's process under uncertainty; *(2)* the assumed *behavioural aspects* affecting thisdecision flow; *(3)* manifest variables and latent constructs related to thedecision flow.
Relevance: The proposed model is designed to be used for surveys and gamification experiments, with relevant operationalised variables made explicit.

Keywords: Uncertainty, Decision making, Buyer-Supplier relations, SCM, Conditioning habitus

1 INTRODUCTION

A vast body of literature exists on decision-making and uncertainty [1]. This study will selectively summarize this body of knowledge, with less interest in the algorithms used in the process of making and taking a decision and what 'uncertainty' may do to such analgorithm. Instead,*'making'* a decision is viewed as the process of deliberation, weighting, waiting, recalling, searching, anddigesting all kinds of relevant and seemingly-not-so-relevant external stimuli, internal experiences and memories and events that lead to a final step: the actual decision was*taken*.

Literature showsan increased interest in the interaction between *normative, descriptive* and *prescriptive theories* of decision-making[2]. "The context affects the form of decision analysis and the way decisions are made";"No decision takes place *in vacuo:* there is always a context"[3](p.2). It was found[4] among managers dealing with buyer-supplier relations, that their decisions, based on their accumulated perception of what to do in a certain situation were*context-driven* and based on passed networks participated in, the world view or socially negotiated order [5] of the companies of the past and present. A world view, reflected in the nature and role of company protocols, procedures and rules, and decided upon by the most powerful functions in the organization: the negotiated social order or hierarchy. These managers were found to have been conditioned [6]into using a set of human-embodied recipes, routines and values.

The author has read with interest and has great respect for colleagues describing and modeling the decision processes in relation to neural networks[7],using Markov decision modeling[8], Monte-Carlo multi-criteria decision models [9], or other sophisticated modeling techniques[10],including the ones used in economic consumer's choice models[11]. Similarly, while it is interesting to read that there are different types of memory [12], this could be considered to be similar to a description of the decision maker's internal algorithm and neural processes. *Interesting, but outside of the scope of this study.*

This study will just take the algorithm used by the decision maker in his process of deciding*for granted*, and the actual *observable* decision will be taken as a starting point.The focus will be onthe nature of a shift in behavior as a result of (increased) uncertainty and to try relating this to some*observablepersonal* characteristics like age, gender, andlevel of Emotional Intelligence including adaptability, education, work experience, emotional and adaptability intelligence, cultural identity as expressed by nationality and *contextual* characteristics expressed by framing a particular contextual situation[13].

2 METHODOLOGY

A broad literature review will be used to generate relevant aspects, to be discussed during a two-day workshop with 10 selected international experts applying a Mini-Delphi set-up [68]. The outcome will be reflected in a hypothetical model, ready for further empirical testing.

3 THE EXISTING BODY OF KNOWLEDGE

3.1 Defining uncertainty

Uncertainty is "… the psychological state in which a decision maker lacks knowledge about what outcome will follow from what choice" [14](p.398.). Busemeyer [15](p.538) describes three classes of situations: "decisions made under conditions of certainty, risk, or uncertainty (..) Under *risk,* each action produces a set of possible outcomes, and the probability of each outcome is *known".*Actions under conditions of *uncertainty*also produce a set of possible outcomes, but the probability of each outcome is *unknown*. Three types of causes for uncertainty can be distinguished [13](p.149): *(1)* inadequate understanding; *(2)* incomplete information and *(3)* undifferentiated alternatives. It may be [16]an*externally* attributed uncertainty, based on *(a)* frequencies or *(b)* propensities, or an*internally* attributed uncertainty, based on *(a)* arguments or *(b)* introspective confidence, equal to 'knowledge'. To make it even more complex, Ülkümen et al.[17](p.1282) write:*Pure epistemic* (knowable) uncertainty is "uncertainty as entailing missing information or expertise concerning an event that is, in principle, knowable. It isrepresented in terms of a single case that is (or will be) true or false and is naturally measured by confidence in one's knowledge or in one's model of the causal system that determines an outcome". In contrast, they distinguish pure *aleatory* (random) uncertainty as "entailing an assessment of stochastic behavior that may be associated with a particular subjective probability but is otherwise unpredictable. Busemeyer [15](p.561) unites some of these distinctions by stating that ".. decision-making under uncertainty involves learning and memory processes when the outcome probabilities are learned through experience". The question is if those learned probability outcomes are viewed or perceived to be the result of a unique situation or can be considered ~~as~~ typical for that class of situations.

Finally, Hansson [18](p.369) distinguishes four *components* of uncertainty: (1) the identity of the options is not well determined (uncertainty of demarcation) ; (2) the consequences of at least some options are unknown (uncertainty of consequences); (3) it is not clear whether information obtained from others, such as experts, can be relied on (uncertainty of reliance); and (4) the values relevant for the decision are not determined with sufficient precision (uncertainty of values).

3.2 Uncertainty, trust and temporal embeddedness

Some authors [19]raise the question if suppliers can reduce byers' so-called Decision Making Uncertainty by building mutually trusting relationships.Trust is 'perceived reliability' and 'integrity of an exchange partner'; it can be viewed in terms of competence, consistency, and benevolence [20].This relates to uncertainty in the perceived capabilities of the supplier, in line with the business marketing literature [21].

One might say that buyers' trust in suppliers is established when buyers believe in the suppliers' willingness "to keep their promises and their ability to deliver competent and need-satisfying performance". "Dependence is defined as the extent to which there is no equivalent or there are no better alternatives available in the market"[19],(p.398);[cf 22].

Instead of 'trust' the concept of 'temporal embeddedness'[23] can be used: the presence of a shadow of the *past*feeding memories about proper and/or inadequate behaviour, and the shadow of the *future*, assumingly reducing opportunistic behaviour[24].This study operationalises this concept by using the length of the past, present and future contract term with the other party. Therefore, 'one-off' deals will be compared with a deal incorporating a *series* of consecutive projects over a certain time span.

3.3 Selective overview of related literature

The economic theory or consumer's choicetypically assumes that the individual decision maker is considered to be 'homo economicus': a person that is *(a)* completely informed; *(b)* infinitely sensitive; *(c)* rational [1](p.381). We know by now, that each of these three assumptions is empirically false[25], but nevertheless, it still is at the roots of many economic theories. To use the metaphor of Plato's Cave, these economic theories have modelled the shadows on the wall in order that they can reproduce the shadows from their models with a satisfactory χ^2, handsome *p* value or other statistical measure, but still, they did not leave the cave to deal with the Real World. Their *predictive* use is close to zero, in spite of the high *ex post* explanatory power, unfortunately. And furthermore, to quote Busemeyer[15](p.548):"(…)the deterministic-algebraic models used to describe decision making under risk with known outcome probabilities cannot be directly applied to decision making under uncertainty with outcomes learned from past experience".Busemeyer and Townsend[26](p.432) remark that "For rational theorists <among classic expected utility theorists> the goal has been to formulate a logical foundation for representing the preferences of an ideal decision maker"[27]. For behavioural scientists, the goal has been "to identify the behavioural principles that human preferences actually obey"[28]. Therefore, these authors' "purpose is to understand the motivational and cognitive mechanisms that guide the deliberation process involved in decisions under uncertainty."[28]. Their Decision Field Theory assumes that when confronted with a difficult personal decision, the decision maker tries to anticipate and evaluate all of the possible consequences. In fact, this is steered or motivated by conditioning from the past: you see what you believe[29]. For decisions, the theory assumes that a vast number of consequences may have to be considered. This, in terms of procurement decisions for instance, does not really apply to so-called 'straight rebuy' situations. The theory states that anticipated consequences are retrieved from a rich and complex associative memory process. Obviously, all of these consequences cannot be retrieved and evaluated all at once. Therefore, the decision maker must undergo a slow and time-consuming

process of retrieving, comparing, and integrating the comparisons over time. “No action is taken until the preference for one action becomes strong enough to goad the decision maker into action.”[26],(p.444). Although with some reservations, one can appreciate the plea for “ more attention should be given to theories of decision making that emphasize learning and memory retrieval (…) rather than concentrating exclusively on deterministic-algebraic theories”[26](p.562).

Authors, somewhat distrustful of ’economic man’ [30], include members of *’institutional economics’*[31]. However, even the *’new’* institutional *economics*, with Oliver E. Williamson[32] and Robert Coarse [33] did not get more realistic than their transaction cost economics, with bounded rationality, possible opportunism, risk minimisation and revenue optimisation[34]. The discussion among various types of (neo)institutionalists in economics, organization theory, evolutionary economists and political science[35]and discussions about the ‘real’ institutionalists [36]“differ greatly in terms of their definition of institutions, in their objects and logics of explanation, and in the ways in which they deal with change”, as Schmidt[37] observes. She divides the large group of (neo)institutionalists into four main sub-categories: rational choice institutionalism, historical institutionalism, sociological institutionalismand finallydiscursive institutionalism;enough to create a lot of confusion. In this study, the approach by DiMaggio and Powell[38] as a more organisational variant, is preferred.Transaction Cost Economics is taken as the typical economic variant.

Experience has shown, that *no theory can completely explain human ‘economic’ behaviour:* neither neo-classical economics, transaction cost economics nor neo-institutionalism of the DiMaggio type; each can explain *some* aspects. To understand, explain or even predict behaviour in a complete picture, we need complementarity between these theories [39].

3.4 Making sense of a situation

This study starts with asking „what actually happens when a decision maker has to take a decision”, apart from the brain activities in a technical sense [7]. Obviously, the decision maker has to recognize the various relevant aspects that may play a role in making that decision. A sensemaker in a situation with many suppliers to choose from and relatively no risk or uncertainty faces different external stimuli, routines from the past, experiences, expectations and uncertainties from a sensemaker facing a new development project with a unique strategic supplier [40]. To use the terms used by Mintzberg et al.[41](p. 253): there are two activities: *recognition* and *diagnosis.* “Diagnosis involves decisions about which type of information to collect in order to begin the process of problem solving”. In other words:*he or she has to make sense of the situation.* In such a situation, experience helps, usually. “Experience is the consequence of activity. The manager literally wades into the swarm of "events" that surround him and actively tries to unrandomize them and impose some order: The manager acts physically in the environment, attends to some of it, ignores most of it, talks to other people about what they see and are doing.” Weick [29](p.148).

There are seven properties of sensemaking [42](p.17):*(1)* grounded in identity construction; *(2)* retrospective; *(3)* enactive of sensible environments; *(4)* social; *(5)* ongoing; *(6)* focused on and by extracted cues; *(7)* driven by plausibility rather than accuracy.It is a process, characterized by *successive stages of enactment, selection and retention*.What may seem relevant in one situation– e.g. a ‘straight rebuy’ - may not seem relevant in another – e.g. a ‘modified rebuy’ or a ‘new task’ [43]. Actually, may well be completely different.

3.5 Conditioning habitus

Managers active in buyer-supplier relations receive training and gain experience – accumulating routines – over the years, building up a cognitive map of structured knowledge. This resembles the conditioning or socialisation process described by cultural anthropologists following Pierre Bourdieu [6][44], where individuals are conditioned into accumulated human embodied routines, values and ways to act – the *modus operandus*- by their *habitus.*This way, practices and decisions of individual decision makers can be influenced, determined or simply transferred through education, training or even through professional norms applying to certain situations [45].

The habitus in fact is the external mould that shapes thinking and behaviour, given of course genetic aspects: the nurture versus nature discussion. It is the accumulated conditioning of past experiences of people, determining his or her cognitive map[46]; of cause/effect chains and his/her world view: how to do things and which concepts, theories or protocols to apply in familiar situations but also in new, hitherto unknown situations. "Mindscapes operate a lot like maps. They shape our perceptions and we see what we expect to see. Mindscapes also have a stealth quality to them. Unnoticed, they frame the way we think and then provide us with a rationale for legitimizing out thoughts and actions." [47](p.40). This phenomenon has been studied in the procurement situation by showing the impact of training, networks one participates and the 'world view' of organisations one is and was part of [4].

3.6The process of verification and deliberation time

A sensemaker, confronted with a particular situation, will go through the stages, described by Weick [42]. However, all kind of forces, features and fatalities may hinder this process, or speed it up. It means that the so-called deliberation time varies: "(...) the deliberation process involves an accumulation of information about the consequences of a decision"[26](p. 455). 'It is a time-consuming and effortful cognitive process that involves an extensive amount of information seeking, weighing of consequences, and conflict resolution"[26](p.432). Over time, information may affect initially perceived uncertainty: "the influence on decisions of the way in which uncertainty is resolved through time represents an interesting area of investigation" [48](p.269). The feeling of uncertainty of persons doing an information search has been studied by Pugh [49]. He found three factors: *(1) Disorientation,*descibed [49](p.161) as "confusion, a sense of being lost or overwhelmed by the scale of the task at hand and a desire for outside help".Two other factors Pugh found were*Prospect*, described as "seem to reflect a kind of groundedness: that users can look ahead to future search sessions, understand where material of interest is located and felt they had made forward progress and *Preparedness* referring "to preparation, planning and trust".A sensemaker who perceives a situation as familiar – hence without perceived uncertainty about the outcome – will use less time to decide, with less checks and rounds of information gathering, compared to a situation that is perceived as unknown or new. The question is whether those additional rounds of information and references gathering can be expressed in monetary terms, or will they result in a particular calculated risk percentage. Hence, replacing uncertainty with 'risk', or 'chance', or the 'odds', being the probability of occurrence of a known potential event, or not occurring of that event. Under complete uncertainty, the decision maker knows neither the complete set of possible events which may take place, nor their exact impact, nor their probability of occurring.

3.7The role of commitment in denying gaps

Yet another aspect that may well affect the verification process is described as the*anchoring process* [50]. AsSchwenk describes [51](p.116), it is a process where up-to-date information that would require the adjustment of initial estimates and perceptions is not fully used, and "the adjustments are typically insufficient. Final estimates are biased *toward* the initial values".Related to this is the concept of increased commitment. "Researchers have found that once an individual commits significant resources to an investment project, he will tend to allocate more to the project if he receives feedback indicating that the project is failing than if he receives feedback indicating that it is succeeding" [51](p.117). So, instead of giving up the project since it is not paying off, decision maker's personal feeling of responsibility induces decision makers to stick to it (cf.[52]).

3.8 Reasoning by analogy

'Misdefining a situation' relates to an oversimplified inappropriate revision of the decision, referring to an analogy [51](p.115).

3.9Prior hypothesis bias

Finally, it may occur that a decision maker simply ignores or does not perceive gaps. This often happens in situations defined as *(a)*insensitivity to predictability, *(b)* insensitivity to sample size, *(c)* illusion of validity. This all leads to increased inaccurateness in the prediction of consequences of alternatives [51](p.115).

3.10Emotional and Adaptability Intelligence

It would be interesting to see if a high score on any of the major aspects of Emotional Intelligence *(EI)*[53][54] plays a role in the nature of the decision or the process of decision taking and whether or not it has any relevance for the nature of the context – for instance dealing with leverage suppliers or strategic suppliers [40] – and the deliberation time and nature of additional info asked for [55]. The same applies for Adaptability Intelligence - usually seen as one of the EI components - as for instance proposed by Natalie Fratto [56]: do we see any difference between people with a high score and a low score?Adaptability is considered as "a personal quality that is important in handling ambiguity, dealing with uncertainty and stress, and in working outside traditional temporal and geographic boundaries" [57](p.249). As to the explicit relationship between Emotional Intelligence and Adaptability, Petrides [53](p.90) found that using his TEIQue set of questions, "The best represented facets were ''happiness,'', ''social awareness,'' and ''emotion regulation'', while the least well represented facets were ''self-motivation,'', ''adaptability,*(sic!)* and ''impulsivity''. The former three can be thought of as most characteristic of trait EI, and the latter three as least characteristic, albeit still part of its sampling domain".

Different approaches with an explicit focus to measure adaptability were found. Karaevli and Hall[58](p. 360) state that adaptability and its related concepts flexibility and versatility are "elusive concepts that have not been well defined in the literature, and therefore, difficult to measure, predict and teach effectively" continuing with"However, even though it may be elusive, adaptability is a keyquality that enables a person to manage the process of change and development..", which

basically is what Darwin already noticed. As Savickas [59](p.51) states, "Adaptabilityinvolves (…)solving problems that are usually unfamiliar, often ill-defined,and always complex."Moving towards actual measurement, we find that adaptability is the result of *individual characteristics* (age, race, gender), *human capital factors* (employability, occupational status, education, tenure, contractor experience) and *work environment* (work demand, managerial support, personal control, communication) [59](p.249).Some of these aspects are easy to measure as manifest variables, others more complicated and need at least a type of factor analysis to create latent concepts. Some of them fit in with recommendations of stress researchers [60]focusing on work demand, managerial support, and personal control, including *Intrinsic motivation.*

Other authors[61],developed the Job Adaptability Inventory (JAI) scale, containing 132 questions for eight dimensions. Yet another tool - the I-ADAPT measure - focuses on adaptability as a *personality-trait* which describes individual's ability to adapt to organizational changes [62].This differs from the JAI scales which measure adaptive performance as *behavior*. I-ADAPT also uses eight dimensions: crisis adaptability, stress adaptability, creative adaptability, uncertain adaptability, learning adaptability, interpersonal adaptability, cultural adaptability, and physical adaptability.One could combine some of these with the manifest variables proposed by O'Connell et al. [57]– like age, gender, nationality, occupational status, education, and tenure.

Balancing *internal* and *external* aspects, Thornley and Raven [63] write"We measureadaptability across three core dimensions *(ACE):* Ability (your adaptability skills), your Character (theinnate aspects of Self that determine the ways in which you may approach adapting), and Environment (how your environment can help or hinder your adaption). Together with sub-dimensions, such as Grit, Resilience, Mindset, and Learning Drive (…)."

Finally, Karaevli and Hall [58] (p.362) write that "Adaptability requires an individual to be capable of making internal changes (self-awareness), and being resilient, positive, confident, and flexible in making those personal changes".

Hence, in conclusion, together with some of the items used for EI by Petrides [53],it looks like a good idea to capture human traits assumingly playing a decisive role in decisions under uncertainty, like *Adaptability*(such as flexibility and willingness to adapt to newconditions), *Self Motivation*(the drive, intrinsic motivation and endurance in the face ofadversity) and, next to an apparent need for self awareness just noted, also *Social Awareness*(the ability to network and social skills).

3.11Digital gamers acting under uncertainty

A long list of various types of sourcesof uncertainty have been listed in the literature on digital gamers. Costikyan[64], suggests 11 sources of uncertainty, thatcan lead to uncertainty forthe player:*(1)* Performative uncertainty*(2)* Solver's uncertainty; *(3)* Playerunpredictability associated withother players, e.g. in a multiplayer game; *(4)* Randomnesse.g. outcomes based on chance; *(5)* Analytic complexity associated with complex decision trees; *(6)* Hidden information; *(7)* Narrative anticipationisthe uncertainty of not knowing the path or the sequenceof events;*(8)* Development anticipation of post-release content; *(9)*Schedule uncertainty; *(10)*Uncertaintyof perceptione.g. objects with hardly-recognisable shape; and finally *(11)* Malaby's semiotic contingency referring to the unpredictability of a meaning that accompanies attempts to interpret agame's outcome, e.g. games creating cultural meaning. Most of these uncertainties are to some extend covered by what was described above. Still, it is interesting to read Christoffer Power's et al.[65]analysis of more than

700 players of digital games, using bi-factor analysis techniques, which resulted in a 5-factor psychometric scale capturing the broad feelings of players about uncertainty in games. “Three of these specific factors appear topoint towards a single generic factor of uncertainty that is internal to the players, one captures experiences relating external uncertainty, with the final factor relating to player’s experience of exploring the game to resolve uncertainty “[65](p. 1033).This supports the distinctions described earlier.

3.12Single decision taker versus team decisions

This study has its focus on single person decision making, and not on group decisions. Team decisions may well be different and have advantages of mixing skills and experience, attitudes and information processing [66]. The single decision maker assumingly will involve other personsin the decision by askingfor references, sharing experiences perceived and believed to be relevant, but – at the end - will still make the decision.

3.13Learning curve effects

One of the questions in taking decisions under uncertainty is, whether experience counts. This would suggest that experienced decision takers know better how to deal with uncertainty.Do they know better how to classify what is ‘really’ uncertain, unpredictable in terms of risk probability and separate the aspects that have a risk probability? This in line with ‘sense making’ processes earlier. In the literature, the issue of a possible *learning curve* is discussed with the following research question [67](p.39) “Is the learning rate maximized through specialization? Or does variation, related or unrelated, enhance the learning process?”and could specialisation lead to a locked-in-mental-map, blind for changes?

4. SYNTHESIS: TOWARDS A CONCEPTUAL MODEL

4.1 Definitions and descriptions

Given the discussion above, this study uses the well-accepted definitions and descriptions of ‘uncertainty’ and ‘risk’: decisions made under *uncertainty* are considered as decisions where actions may lead to a set of consequences, but where the probabilities of these outcomes are completely unknown.To describe or model the process of decision making, the definitions above were used and combinedwith a number of behavioural approaches: field theory, cultural materialism, sense-making, ‘naturalistic decision-making’, isomorphic institutionalism, concepts from business marketing, procurement concepts and combinations and applications of these theories.

4.2 The Model

The decision maker has to make sense of external stimuli with a conditioned structured knowledge based cognitive map based on past experiences that causes him or her to look only for certain signals, considered and perceived to be ‘relevant’, with a – likely – ‘biased’ interpretation, while ignoring or eliminating other signals; “You see what you believe” [42]. As stated, this study does not try to measure or represent the cognitive map directly, but will focus on the *result of any action*,

given the latent concepts of personality, cognitive map and the way perceived information is selected, perceived and used for any decision and action.

Therefore, the conceptual model proposedwill be a 'layered model': figure 1 for just the *decision flow,* figure 2 including the *behavioural* aspects assumed to play a role and figure 3 including the *observable – manifest – variables* to be used and measured in empirical research. 'Personality' in fact is a latent variable *per se* that will be operationalisedto some extend using manifest variables or tests. Hence:

(1) the *actual decision flow* of any decision maker (in blue):
    a. the verification process incorporating enactment, selection and retention
    b. the decision makers *experience*, his/her *memory* – cognitive map - the as *facts* perceived observations and the *company protocols*
    c. the decision resulting from
        i. either decide to see it as a *standard repeat task* or *straight rebuy* leading towards a standard action; or
        ii. alternatively, a *delay* leading
            1. either to a situation where possible gaps are simply ignored and the *standard* action is taken or even resources are *added* or
            2. the decision maker decides to asses uncertainty by a search for information considered and perceived as *relevant*, or perceives the uncertainty as a combination of risks with known probabilities and makes a *risk analysis*.
    d. the outcome of the info search and/or risk analysis is either
        i. a decision it should be viewed as a new task,
        ii. a modified rebuy or
        iii. the project is abandoned.

(2) the hidden or latent *internal personal behavioural* characteristics (in green) that in particularly may play a role when the decision maker deviates from a more 'rational' decision process:
    a. Elements that may play a role in the initial verification trajectory[13](p.149):
        i. an inadequate understanding of the situation
        ii. incomplete information
        iii. undifferentiated alternatives.
    b. Aspects of uncertainty that may occur[18](p.369)):
        i. uncertainty of demarcation
        ii. uncertainty of consequences
        iii. uncertainty of reliance
        iv. uncertainty of values
    c. Elements of the 'anchoring process"[50][51]:
        i. Increased commitment
        ii. Reasoning by analogy
        iii. Prior hypothesis bias
        iv. Increased commitment

d. Personal characteristics that may lead to improper interpretation of information[13](p.149):
    i. Insensitivity to predictability
    ii. Insensitivity to sample size
    iii. Illusion of validity
e. Part of the decision maker's *personality* that we will not measure;
f. Aspects of the search process [49](p. 161):
    i. Disorientation
    ii. Prospect
    iii. Preparedness

(3) The hidden or latent *external*behavioural characteristics (also in green) that in particularly may play a role: the Socially Negotiated Order or World View of the organisation where the decision maker works or has worked for many years;

(4) The *observable characteristics* (in Bordeaux colour) assumed to play a role in the verification process[53][57](p.249)[62]:
    a. Personal data:
        i. Organisational historyof the decision maker including type of business;
        ii. Functional past – Marketing, R&D, Finance, Production, Procurement, Logistics, other function;
        iii. Educational history, in particular diplomas issued by professional organisations;
        iv. Nationality;
        v. Family situation; children, number of brothers and sisters;
    b. *Age*, assumed to impact in particularly experience and memory;
    c. Part of the *Personality* characteristics that we will try to capture using 11-point survey questionnaire items; in particular some aspects of Emotional Intelligence including Adaptability Intelligence and Adaptability Intelligence *per se.*;
    d. *Temporal embeddedness,* measured as prior knowledge and experience with suppliers and future length of present contract and proposed contract;
    e. *Deliberation time,* measured as the time a decision maker uses to make a decision in the experiment [55].

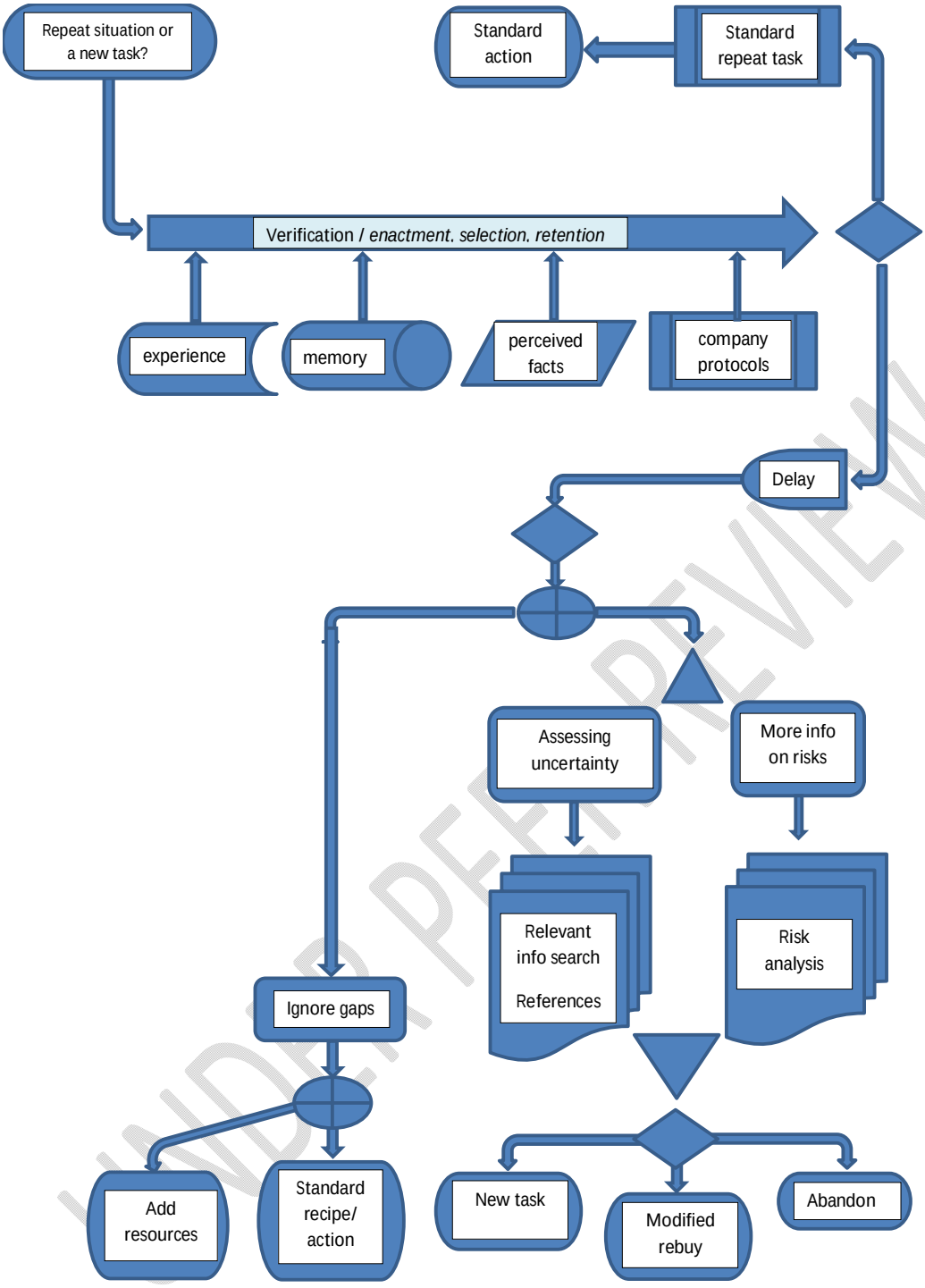

Fig. 1: Assumed decision flow of the decision maker's process under uncertainty

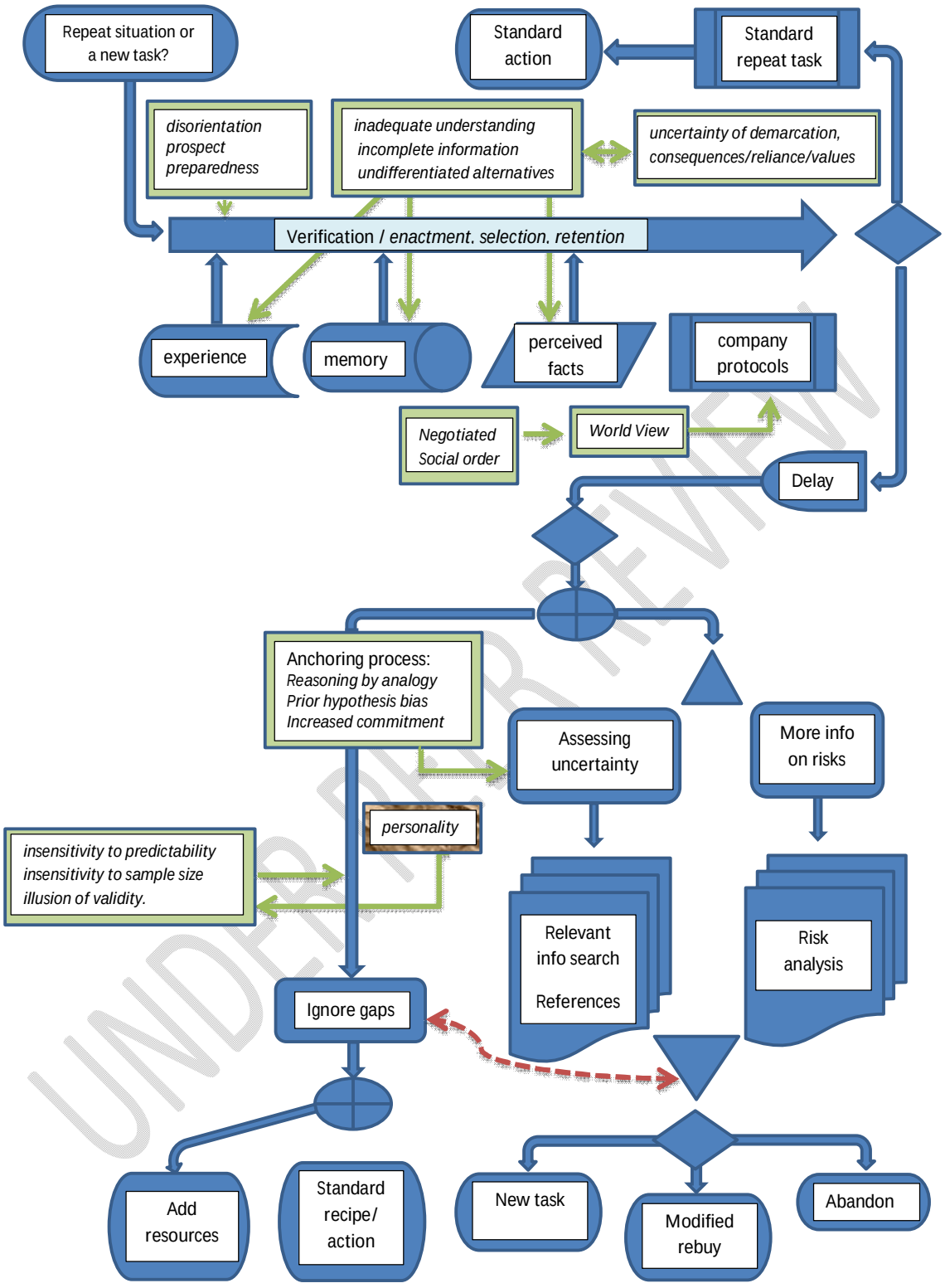

Fig. 2: Assumed behavioural aspects(in green) affecting the flow of the decision maker's process under uncertainty

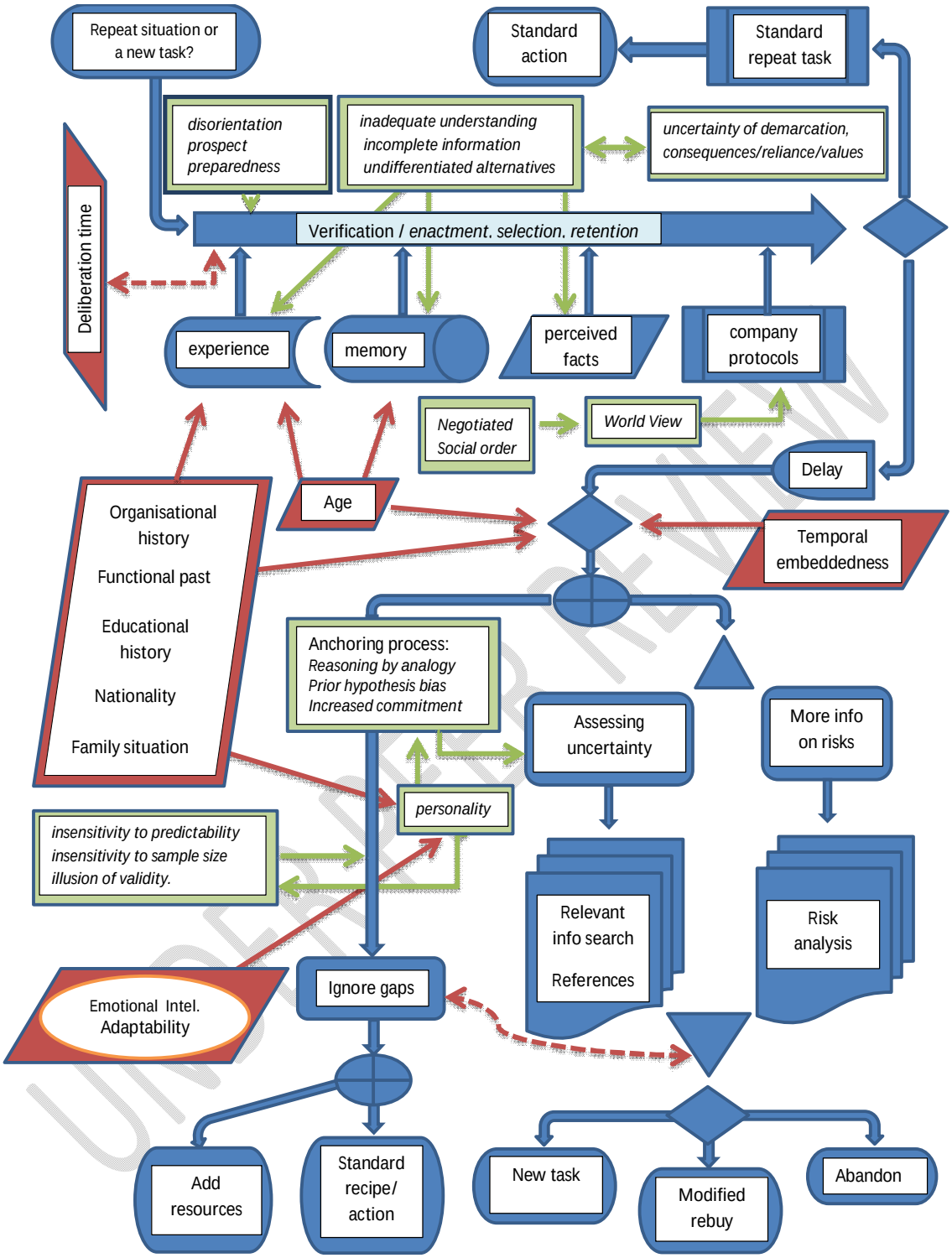

Figure 3: Manifest variables (in red) and their relation to the flow of the decision maker's process under uncertainty

5 DISCUSSION

The results of the study were discussed, evaluated and commented on during a two day workshop. In this MiniDelphi set-up [68], selected international experts participated, which resulted in the construction of a preliminary tentative model in the style of a linear structural equations model (fig. 4). While the model is meant to be relevant for buyer-supplier decisions, it could well be applicable to other types of relations.

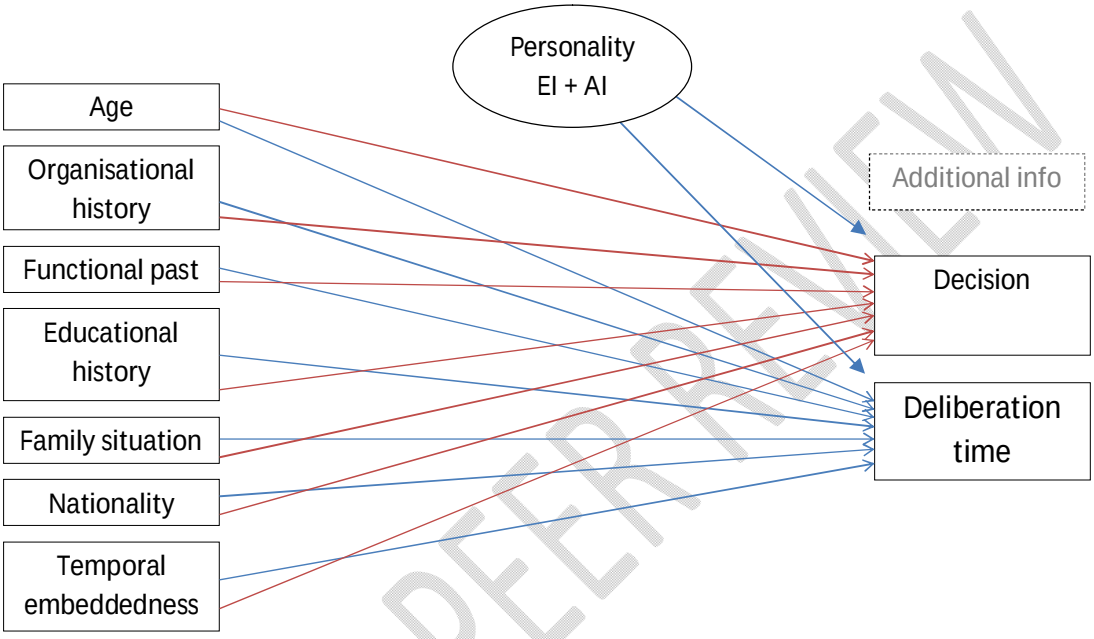

Fig. 4: A tentative model of decision making under uncertainty

6. CONCLUSIONS

It was possible to derive relevant process steps and aspects from literature. This resulted in a three-layered model showing *(1)* theassumed *decision flow* of the decision maker's process under uncertainty; *(2)* the assumed *behavioural aspects* affecting thisdecision flow; *(3)* manifest variables and latent constructs related to thedecision flow. A MiniDelphi session refined the findings and enabled the formulation of a tentative model, designed for further empirical testing.

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