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Comparing Innovation Adoption and Organizational Buying Behavior Approaches in a Context of Technological Investment Decision-Making

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Abstract— The statement by Cyert, Simon and Trow [1, p. 237] that “Decision-Making – choosing one course of action rather than another, finding an appropriate solution to a new problem posed by a changing world – is commonly asserted to be the heart of executive activity in business.” holds true still after fifty years although a lot has changed in business from those days. New products are launched more frequently to markets and technological innovations alter structures of competition and disturb equilibrium of markets. These dynamics can pose not only opportunities but also threats for firms, depending upon the timing of adoption. The most innovative companies may gain competitive advantage over competitors by adopting and implementing performance improving technologies. On the other hand, the non-adopters may suffer from the improved performance of the adopters. This paper examines conceptually a process of decision-making on new technology discussing organizational buying behavior approach and innovation adoption approach in regard to general decision-making approach and finally combines these fields in order to conceptualize and understand better the process of decision-making on new technological investment.

I. INTRODUCTION

Decision centrality is common to theoretical discussions, innovation adoption and organizational buying behavior. The most widely referenced models of organizational buying behavior (e.g. [2], [3]), namely *the buygrid model* [4], *the general model for understanding organizational buying behavior* [5] and *the model of industrial buyer behavior* [6] view organizational buying as a complex process of decision-making [7]. Studies in which organizational innovation adoption has been scrutinized have mostly concentrated on decision-making outcomes and factors affecting a decision process. Although these factors and their influence on the decision process are extensively studied, the process

itself is considered as “black box” yielding innovation adoption or rejection. The studies of the dynamics of the innovation decision process, and the identified factors influence on each step of it, are rare [8]. On the other hand the innovation adoption approach, although being powerless to consider the process, captures well the complex nature of new technologies affecting the process. Vice versa organizational buying behavior research considers the purchasing process dynamics, but is a general theory of how various sort of products are being bought and in this way is incapable to capture the special nature of new technologies.

This paper examines conceptually a process of decision-making on new technology discussing organizational buying behavior approach and innovation adoption approach in regard to general decision-making approach and finally combines these fields in order to conceptualize and understand better the process of decision-making on new technological investment. In the literature, the link between innovation adoption and organizational buying behavior is considered to some extent [9], [8] but remains largely implicit. Due to the essential role of decision-making for the successful consideration of these approaches, we shall next consider the structure and features of decision-making in more detail and then zoom into the innovation adoption approach and then into the organizational buying behavior approach. Finally the work is drawn up in findings, discussion and conclusions and combination model of the approaches is presented.

II. THREE PERSPECTIVES ON TECHNOLOGICAL INVESTMENT DECISION-MAKING

A. Decision-making Approach

According to Mintzberg, Raisinghani and Théorét [10] decision is “a specific commitment to action” where the action has strategic consequences for the organization making the decision. Cyert and March [11] define organizational decision as an “execution of a choice made in terms

of objectives from among a set of alternatives on the basis of available information. On an abstract level decision-making refers to organizational behaviour that takes a process form and has certain consequences and prerequisites. Produced decisions link the current organizational activities and commit the organization to certain new direction and towards certain goals in a future. In this sense decision-making can be seen economically motivated purposeful action.

On a basis of a context of decision-making and its role in economical activity different decision types can be recognized. *Operating decisions* refer to decisions that deal with the firm's resource-conversion process and are taken in order to maximize the profitability of current operations. Operating decisions include areas as supervision of performance, resource allocation among functional areas and product lines, scheduling of operations and applying control actions. Key characteristics of this type of decisions are that they are decentralized, repetitive and self-regenerative and consider the value-added processes in organizations. Decisions that concern the link between organization and external environment i.e. what business the firm is in, what businesses it will try to enter and what are the products the firm offer are called *strategic decisions*. The strategic decisions are centralized, non-repetitive and not self-regenerative. *Administrative decisions* mean decisions to organize the structure of the firm in a way which creates a maximum performance potential. Through administrative decisions the structure for the value-added processes are created and match between strategy and operations is improved. Administrative decisions may be triggered by strategic or operating problems or opportunities [12].

Managerial problems vary from truly generic to truly unique events. The classification of the given problem is essential phase for the successful problem solving [13]. Simon [14] divides decisions into *programmed* and *non-programmed* decisions. These two represent polar types of decisions located in the opposite ends of a continuum. There can be found also decision in the area between these two. Repetitive and routine decisions are programmed decision to the extent that a definite procedure has been created for handling them. Novel, unstructured and unusually consequential decisions are non-programmed decision. There is not an exact procedure to follow due to newness or importance of the decision making situation or the elusive or complex nature and structure of the decision at hand.

Simon [14] divides decision making into four phases: finding occasions for making a decision, finding possible courses of action, choosing among courses of action and evaluating past choices. Drucker [13] identifies six steps in an organizational decision making process: problem classification, problem definition, the answer specification, the best solution decision, realization plan and evaluation of the realization plan. Although the number and naming of stages differ the central idea of these processes is same.

Basing on Kunreuther and Bowman [15] and *reactive* and *proactive* pattern of behavior (see e.g. [16], [17]) we

propose the following model of organizational decision-making (Figure 1).

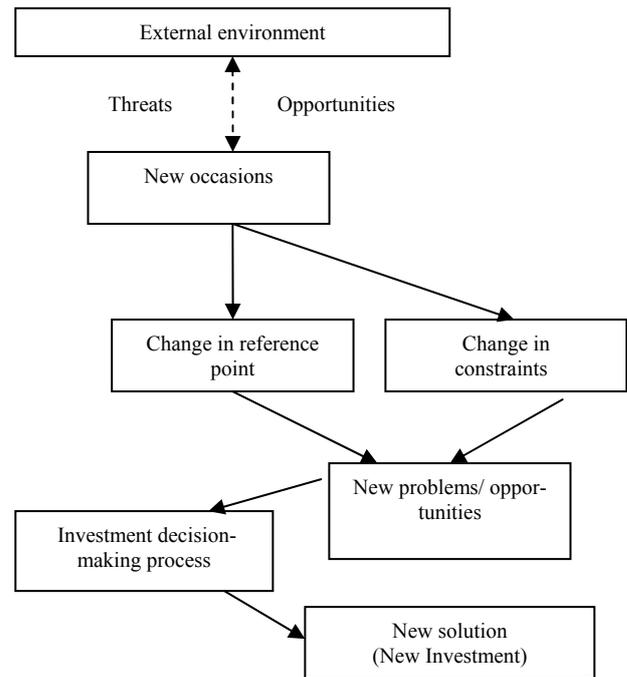


Figure 1 A Dynamic Model of Organizational Decision-Making (revised from [15], p. 407)

According to reactive and proactive patterns of behavior, the environment-organization relationship is seen as two-way (Figure 1). In the reactive pattern of behavior, new problems are solved through a technological investment. In the proactive approach the organization actively seeks new opportunities and attempts to exploit them by investing in new technology.

The model presented is not statistically tested, but rather constitutes a rough formulation of the decision process. The idea of the model (Figure 1) is that changes in environment generate problems and organizational decision-making is an act to overcome these problems. The decision-making and the proposed course of action is evaluated comparing it with the status quo. According to Kunreuther and Bowman [15] "Reference points are specific values or states of the world used to judge alternative proposals." Several different reference points may be used in the managerial decision process. A great number of organizational studies show that status quo is used as a reference point and change is resisted in organizational decision-making [11], [18] although changes in reference point may occur that may lead to new problems or opportunities.

Changes in reference point can come from outside or inside the firm. Mintzberg [19] has studied an organization's response to its environment and argues that patterns of strategic change are never steady, regular or foreseeable. Periods of change follow periods of stability in the organizational environment. Tushman and Romanelli [20] describe organizational activity as "punctuated equilibrium" in which stability and change alternate with each other, some-

times triggered externally and sometimes internally. New laws or restrictions made by a government are examples of factors changing the reference point outside the firm. Intra-firm debates or different events may change the reference point from inside the firm. Instead of the status quo being a reference point, the firm can start to evaluate the proposed course of action by comparing it with a worst case scenario, for instance [15].

“Constraints represent limitations or restrictions on the actions a firm can take.” [15]. Internal or external factors may cause a change in constraints. The emergence of new constraints or changes in old ones can be due to organizational shifts within the firm, such as the appointment of a new manager whose views differ from the predecessors’, or they may also be triggered by external events such as new legislation, increased costs of capital or changes in consumers’ attitudes. A study of 30 businesses in the US health care industry showed that the firms were likely to make strategic changes due to changes in the rules of the business that were in turn due to government legislation and new regulations [21].

A change in reference point or in constraints leads a firm to a new situation in which it has to take action to maintain balance with the environment. In Figure 1, this new situation is discussed new problems or opportunities. The decision process is set in motion to find a match or fit with the environment. The output of the decision process is considered as new solutions (or new investment) in the model presented.

The decision-making processes vary in terms of length and scale. Kriger and Barnes [22] have developed a six-level classification of decisions according to decision complexity (cf. [23]). *Decision choices* are single go/no-go choices. The actual choice appears at a moment in time, although these choices often occur after extensive individual or organizational analysis. *Decision Actions* e.g. writing a letter, holding a press conference, are aggregated decision choices. Within decision actions there are several decision choices. Decision actions construct *decision events* that usually involve actors both inside and outside the firm and last from a day to a week. Different meetings may constitute decision events. A series of separate, but related decision events generate *mini-decision processes* that might last from a several months to about a year. The decision processes to form a consortium or merge with another company are examples of mini-decision processes. *Decision processes* span periods of time lasting one or more years and usually involve hundreds of actors. *Decision theatre*, the last and broadest concept, refers to very long-term decision processes such as a worldwide strategic decision and its implementation [22].

B. Innovation adoption approach

Innovation adoption is a part of an *innovation diffusion process* that refers to antecedents and timing of an individual adoption decision by an adoption unit and factors affecting that adoption decision. This research tradition has its roots in consumer marketing context but the approach has been applied later on business to business context as

well. As a part of the innovation diffusion approach an individual adoption decision is interesting only in a sense that factors affecting it can be generalized to cover other adoption decisions on that specific innovation within the same social system and this way it gives insights of an aggregate level diffusion phenomenon that recruits mathematical modeling usually (see e.g. [24] for a review). Diffusion models can be divided into those considering a diffusion process as a whole on an aggregate level and models concentrating on determinants of individual adoption decisions. The former are known as *diffusion models* and the latter as *adoption models* [25], [26].

It seems that innovation adoption has at least two different meanings. In a context of diffusion it is understood as a *choice* type decision. This perspective has dominated the field as research has been typically carried out with a large sample of organizations and focusing on correlations between groups of variables and a specific outcome. These models are incapable to explain how these factors evolve and interact with other factors during the process finally producing adoption (or rejection see e.g. [27]) In a context of intra-firm decision-making innovation adoption refers to a whole decision-making *process*. As a process, innovation adoption is not seen only a vehicle producing innovation adoption or rejection that is interesting only as a part of an aggregate level cumulative pattern. Rather it is considered meaningful itself. This perspective brings innovation adoption close to organizational behavior and innovation adoption can be seen as an organizational action taken to change the relationship between the organization and its environment somehow [28], [29]. This process perspective has been manifested for example by Drury and Farhoomand [30] who claim that innovation adoption should not be treated as dichotomous organizational choice decision but rather there is a need for integrative theories considering adoption as a chronological process (see also [31]).

In addition to duality of a phrase “innovation adoption” recognition of a process nature of industrial innovation adoption has led to various interpretations for the term adoption in this process context. Consumer adoption decisions differ in many ways from industrial market adoption decisions. Unlike consumer durables, organizational innovations need to be implemented as a part of value adding activities of an adopter organization. This lack of a concrete implementation phase or a process in a consumer innovation adoption context has led to difficulties and various interpretations when researchers have tried to apply conceptualizations into the organizational innovation adoption context. Sometimes these terminological pitfalls have been tried to avoid by using other, in common language quite similar meaning possessing concepts for adoption in order to distinguish a piece of research from the fuzzy innovation adoption approach, even though the underlying idea has been drawn from the innovation adoption context. This has created even more disorder.

Intra-firm diffusion, implementation and *organizational acceptance* are closely related concepts that generally refer to actions that are taken in order to take the adopted inno-

vation in full use at the adopter company and after that to use it by the employees (cf. [32]). The concepts of *authority decision* as organizational adoption decision on an innovation that is targeted to be used by individual employees and that following *end-user's adoption decision* as a decision taken by an end user to take the innovation in his use have been used by Leonard-Barton and Deschamps [33]. Both these approaches advocate an idea that for some type of innovations an organizational adoption decision process is followed by implementation and individual decision processes within an adopter company. Meyer and Goes [34] define *assimilation* as "an organizational process that (1) is set in motion when individual organization members first hear of an innovation's development, (2) can lead to the acquisition of the innovation, and (3) sometimes comes to fruition in the innovation's full acceptance, utilization, and institutionalization." The process of assimilation is divided further into three sub-processes (a knowledge-awareness stage, an evaluation-choice stage and an adoption-implementation stage) each consisting of three episodes. This term covers widely an adoption decision process, its outcome as an innovation adoption choice decision and a phase of implementation and intra-organizational diffusion after that. Woodside and Biemans [35] have described comprehensiveness of assimilation using terms breadth of use (cumulative number of users) and depth of use (extent of use and its impact on the firm).

To conclude we state that adoption as a process refers to an organizational decision process from its outset until the decision to adopt an innovation (see e.g. [36], [35]). The processes that follow this organizational adoption decision process are not included into our definition, but should be named rather as suggested above (see [37]). This ideology has its roots on an idea that underlies the whole adoption and diffusion literature that originally adoption refers to acceptance of change and episodes before this acceptance and is finished when the decision has been made. Episodes and processes that follow the adoption process are seen as concrete conduct of this accepted change.

Langley and Truax [23] put process-oriented technology adoption models (innovation and technology are considered as synonyms quite often in the literature see e.g. [38]) into three classes: sequential models, serendipitous models and political models. In *sequential models* adoption is seen as a multilevel decision process composed of series of sequential phases involving different activities. This process approach is supported by an extensive empirical literature on strategic decision-making in general (see [10] and [39]) and was put forward in the innovation adoption context by Rogers [40] establishing a permanent approach and followed by a stream of research (see e.g. [41], [42], [43], [44], [8]). A number and order of stages of different models varies but the basic idea remains the same.

Serendipitous models understand adoption as an outcome of a wide variety of organizational routines. Innovation adoption is included in these standard operating routines that are basically organizational responses to an environment. Under some conditions interplay between an organi-

zation and an environment produce innovation adoption [45], [23]. Langley and Truax [23] give the well-established garbage can model of decision-making by Cohen, March and Olsen [46] as an example of ideology advocated by serendipitous decision-making models in general. The garbage can model promotes an idea that organizational decision-making is not in reality as linear, mechanistic and sequential than the sequential models describe it to be: "Although it may be convenient to imagine that choice opportunities lead first to the generation of decision alternatives, then to an evaluation of those consequences in terms of objectives, and finally to a decision, this type of model is often a poor description of what actually happens." [46].

Political models consider adoption as a political process where adoption decisions are fostered by technology advocates who have an influence on managerial level decision-makers. These models emphasize social interaction during the process. The participants of the adoption process can be grouped into champions, boosters and approvers of technology. Reasons for adopting a technology can be based, for example, on financial or strategic components, the credibility of advocates or political pressure. Political models take into account the different influences on adoption from outside and inside the organization during the process. Decision-making and the power of the organization are considered to be centralized and open to influences. [4].

C. Organizational Buying Behavior Approach

The more complex the product is the lengthier the buying process is likely to be due to difficulty of risk evaluation. A risk can be divided into a performance risk and a psychological risk. The former refers to an extent to which the purchase meets the expectations and the latter to how other people in the organization react to decision. Low involvement buying situations are likely to be handled autonomously by an individual decision-maker according specific buying criteria. Due to a higher risk and higher organizational involvement for complex products a buying center makes the buying decision [47]. The former captures three critical concepts (underlined) of organizational buying. The following section starts a discussion from a buying process and then moves on to consider different buying situations or tasks as one factor affecting the buying process and finally zoom into a concept of buying center. The buying task has been chosen among other process influencing factors due to the context of technology buying and because it has been suggested to bridge the innovation adoption and organizational buying approaches [9].

This structure of consideration is in harmony with a classification of organizational buying behavior research offered by Möller and Wilson [48]. They propose that the traditional research of organizational buying can be classified into studies focusing on (1) the phases or sub-processes of the buying process, (2) the characteristics and composition of and interaction within the buying center and (3) factors influencing (like buying situation) the process and buying center.

1) *Buying process*

Organizational buying behavior has been approached from several different viewpoints. The three main approaches are task models, nontask models and complex models [49], [50]. According to Webster and Wind [5], *task models* often focus on economic aspects of organizational buying behavior such as price or related costs (see also [49]). These models ignore the influence of the characteristics of the individual decision maker, interaction among members of the buying organization and the nature of the formal organization on the decision process outcome. These models lack behavioral explanations and consider the individual as a rational decision maker synonymous with the firm. *Nontask models* introduce nonrational/noneconomic factors affecting the decision process and concentrate on the psychological aspects of an individual. These models, being more holistic and understanding the circumstances of the decision process more widely than task models, lose the point that the organizational decision process is problem solving with specific objectives and goals. The decision maker is also considered synonymous with the firm but interested primarily in self-gain [5], [49].

The problem with the task and nontask models is that they both emphasize some set of factors while excluding the others. An attempt has been made to overcome these problems by presenting *complex models* combining the best features of both types of model [49]. Johnston [51] argues that the buygrid model [4], the general model for understanding organizational buying behavior [5], the model of industrial buyer behavior [6] and the industrial market response model [52] are four of the best developed and comprehensive complex models presented.

Johnston and Lewin [3] analyzed and summarized the 25 years of research of organizational buying behavior initiated by Robinson, Faris and Wind [4], Webster and Wind [5] and Sheth [6], by reviewing 165 articles on the topic. Since the presentation of these models, they have established the conceptual foundation for the study of organizational buying behavior to this day and followed by hundreds of articles extending or testing them. ([3], p. 1–2 see also [2] p. 7) The idea of seeing organizational buying behavior as a process composed of a sequence of phases or stages is common to the three models. Although the number of stages in the process varies between the models (buygrid: 8, general model for understanding organizational buying behavior: 5 and model of industrial buyer behavior: 4), the nature and sequence of events are quite similar. In addition to the process nature of the models, they all present variable categories influencing the buying behavior (buying process). Of the total nine different categories three are shared between the models, namely the category of *environmental influences* (physical, political, economic, suppliers, competitors, technological, legal, cultural and global), category of *organizational influences* (size, structure, orientation, technology, rewards, tasks and goals), and the *individual participants' characteristics* (education, motivation, perceptions, personality, risk reduction and ex-

perience). In addition to these the Robinson, Faris and Wind model and the Sheth model have *purchase characteristics* (buy task, product type, perceived risk, prior experience, product complexity and time pressure) and *seller characteristics* (price, ability to meet specifications, product quality, delivery time and after-sales service) in common.

The sixth category, *group characteristics* (size, structure, authority, membership, experiences, expectations, leadership, objectives and backgrounds) is presented in Webster and Wind's general model for understanding organizational buying behavior, and two final categories in Sheth's model: *informational characteristics* (salespeople, conferences, trade shows, word-of-mouth, trade news, direct mail and advertising) and *conflict negotiation characteristics* (problem solving, persuasion, bargaining and politicking). After 25 years of empirical testing, these nine fundamental concepts (the process nature of buying and the presented eight influencing factors) of the models still hold valid. But on the basis of an extensive review of articles in the field, four constructs needed to be added: on an intra-firm level *decision rules* and *role stress* and on an inter-firm level: *buyer seller relationships* and *communication networks*. The latter operates also on an intra-firm level. Decision rules refer to the rules used by the buyer to handle different buying situations. These rules vary in their degree of formality. The second intra-firm level concept, role stress, means ambiguity or conflict in buying objectives (cost reduction and concurrent quality improvement). An inter-firm level concept, buyer seller relationship, refers widely to a dyadic and network perspective of organizational buying. The implicit view in this addition is that factors affecting buying behavior also combine to affect a firm's supply relationships. The other added concept, communication networks, refers to an intra-firm level to communication in buying center and on an inter-firm level to communication between different actors [3].

2) *Buying task*

Möller [53] states that attempts to generate generalizable results on the structure and elements of the buying process face an essential problem caused by "the complex idiosyncratic nature of organizational buying". This is due to variance in buying situations, people, departments and organizations involved and a context or an environment. The situational variances led to the classification of new buying task, modified rebuy and straight rebuy [4]. This classification is closely linked with an information level of the buyers, a risk perceived and search behaviour, but is insufficient to provide a definition for product complexity or significance in a situation at hand. Möller [53] suggests replacing this paradigm with extensive problem solving, limited problem solving and routinized response behaviour categorization of decision processes (see e.g. [54] and [55]).

This categorization however does neither explicitly take into account a relative importance of the buying situation or

the product. To offer a more comprehensive conceptual framework Möller [53] superimpose an organizational commitment dimension on the presented categorization. Here organizational commitment refers to a degree of the organization's perceived commitment to the product. The commitment dimension together with the categorization of decision processes offers potential for developing time and organizational buying policy based hypotheses about movements of products and buying situations in a two dimensional buying (high commitment-low commitment) space. The transition can be initiated from an internal (buying policy) or external context of a company [53], [56].

3) *Buying center*

The notion of a buying center has been the most important conceptual contribution within the research on organizational buying behavior [57]. Finding an answer to the question "who does the buying" has been a primary attempt within the organizational buying behavior research. From a marketer's point of view this kind of knowledge is an essence to approach a customer. Since 1970's the idea of buying as a multi-person process culminated in the concept of "buying center" [5] that became the prevailing framework to conceptualize industrial buying [58]. The buying center concept refers to all those members of the organization involved in the buying decision process with responsibility for buying [5], [59], and [60]. It can be stated therefore that to understand organizational buying behavior one must understand group behavior [61].

There have been various attempts to find a covering solution to questions that when the buying decision is done by a single person and when it calls for multi-person commitment (see e.g. [62] and [58]), what is the relevance of the different members in different buying situations [63], [64] and what are the stages of buying [65] but common answers covering all buying situations have not been found. The studies of the buying center have their theoretical backbone mostly in the social influence/interaction theory and organizational psychology [53].

Understanding how influence is distributed within a buying center is critical but still a fuzzy area in the organizational buying research. McQuiston [66] defines influence in the buying center as "the extent to which the communication offered by an individual for consideration is perceived to affect the actions of other participants in the decision-making unit." Research of personal influence within the buying center can be put in two: the research examining the influence of people in certain positions during the different phases of the decision process and the research concentrating on how some individuals influence and change the opinions and actions of others. Despite the contribution of both approaches during the long research tradition there are still gaps in understanding influence within the buying center especially in a case of new task buying situation in which typically new knowledge is generated during the process [67]. Possession of information may be affected by a position in the organization or personal needs and charac-

teristics. Control of information was found to be important base of influence within organizational buying decisions by Pettigrew [68] and after that a critical role of information with limited access has been confirmed by various researchers [69], [70].

Lichtenthal [50] suggests definitions of buying center roles to be the most permanent concepts in the organizational buying behavior research. Roles allow members of a buying center to be studied as individuals as well as a part of the group. The roles are in a key point when attempting to find a solution to the question "who does the buying?". Lichtenthal [50] propose that neither an individual nor an organization resolves a buying situation but rather the decision will come up as a result of a small group task process, which consists of outcomes from individual task processes. Concentrating on behavior results makes identification of different stages of the decision-making process and the organizational positions of the members less important in understanding the buying process. In other words, rather than the positions the distribution of complementary role behaviors, which members execute, form a structure for a buying center. On the other hand adopting a group behavioral view on buying, the documented variance of number of stages during the process (see e.g. [51]) is easy to understand. The stages identified in different studies reflect rather a few acts in the buying process or major behavioral events during it consisting of hundreds of behavioral acts [50].

Webster and Wind [5] have proposed five roles for the buying center participants: users, buyers, influencers, deciders and gatekeepers. *Users* are those who use the product to be bought. *Buyers* and *influencers* are those who influence the process directly or indirectly by providing information and evaluative criteria. *Deciders* are capable of making the choice among alternatives. *Gatekeepers* filter incoming information to the buying center. This classification is very intra-firm oriented and gives an idea of the organization as a passive information seeker. The role of active outward orientation is captured in the boundary spanning role suggested by Tushman and Scanlan [71] and defined as an individual who actively participates in various types of inter-organizational networks. It has been proposed that different persons may hold the same role or one person can perform various roles [50].

Rogers and Kincaid [72] presented an information network approach that can be well applied on an intra-firm or inter-firm level to describe communication processes among certain systems. The network approach adopts communication links rather than isolated individuals as units of analysis and aims to make visible, understandable and manageable the communication structure that people live within. Instead of restricting a unit of analysis to individuals, communication network analysis conceptualizes human communication as a process of mutual information-exchange. Rogers and Kincaid [72] define communication as "a process in which the participants create and share information with one another in order to reach a mutual understanding." This means that communication is always a

joint activity, a mutual process of information sharing between two or more parties and involves always a relationship. These interrelated relationships form communication networks of interconnected individuals “who are linked by patterned flows of information”. As a result of information-sharing, individuals converge or diverge from each other in terms of their mutual understanding of reality [72].

At individual level information processing involves perceiving, interpreting, understanding, believing and action, which results perhaps to new information for further processing. Collective action, mutual agreement and finally mutual understanding may be achieved through a combination of the individual level actions. The other possible results in addition to mutual understanding with mutual agreement are: mutual understanding with disagreement, mutual misunderstanding with agreement and mutual misunderstanding with disagreement. The prerequisite for these collective results is that individual information processing becomes human communication among two or more persons who hold the common purpose of understanding one another [72].

III. FINDINGS, DISCUSSION AND CONCLUSIONS

In the literature, innovation adoption decisions are often considered as decision choice type decisions [73], [74], and [75]. On the other hand in some studies (e.g. [8]) innovation adoption can be seen to refer to a whole decision process, not just an outcome, culminating in innovation adoption or rejection. These process adoption models as well as organizational buying behavior models [4], [6], [5] see investment decision-making as mini-decision process or decision event.

The innovation adoption approach recognizes the dynamic link between organization and its environment demonstrated in Figure 1. Damanpour and Gopalakrishnan [28] view an innovation adoption as “an organization’s means to adapt to the environment, or to preempt a change in the environment, in order to increase or sustain its effectiveness and competitiveness.” This idea lacks from the organizational buying behavior approach as it traditionally concerns other types of products (raw materials etc.) than technological investments that has power to change the prevailing organizational structures. In this sense the innovation adoption approach highlights the change in a reference point or constraints launched by an external factor as it considers a new innovation and awareness of it an initiator of the decision-making process. The organizational buying behavior approach sees the process more internally oriented. On the other hand the innovation adoption approach fails to capture the intra-firm dynamics during the process namely how investment decision is generated through individual level interaction among decision-making participants. This is considered explicitly in the organizational buying behavior approach. As buying process a process of investment decision-making on new technology is a new task buying situation and due to newness and most often high risks and high commitment the process is lengthier and various participants are involved within an organization. Investment deci-

sions on new technology, seen as adoption or buying may be strategic or operating by their nature and the way they are processed may fall to programmed or non-programmed category depending on a complexity of a situation. The stages of the process vary between the models but the step by step progressing approach is shared commonly. Although serendipitous innovation adoption models make an exception of this as they deny clear stages and instead accentuate the interplay between the organization and the environment producing investment.

These similarities and differences between the innovation adoption and organizational buying behavior approaches form a fruitful basis for combination of these approaches in order to better conceptualize and understand the process of decision-making on new technology. The combination of innovation adoption and organizational buying behavior approaches is presented as *the preliminary model of technological investment decision-making* in Appendix. The model has two levels: micro and macro. The macro level refers to the macro environmental dimensions (political, economical, social, technological, legal, and cultural) that have influence on an organization. The relationship between the organization and its environment is highlighted in the model. The investment decision-making process is an outcome of this relationship. The environment poses both threats, for which an organization may prepare itself, and opportunities which the organization may attempt to seize. The investment decision-making process may be triggered by both reactive and proactive factors. Reactively initiated processes result from some changes at the macro level that an organization is passively forced to response. Proactively initiated processes are the result of an organization’s active monitoring of an environment. Organizations attempt to gain competitive advantage over the others by investing in new technology.

The preliminary model of technological investment decision-making (Appendix) consists of combination model of buying that based on meta-analysis of 165 buying related publications [3], combination model of innovation adoption ([8]) and other innovation adoption related literature [75], [76], [77]. The model is not statistically tested but presents rather a proposition for further research attempts. The model is composed of the *decision process*, which is put in the middle of the model, and the *factor groups* (adopter organization, purchase, seller, innovation, decision-making unit (DMU), social system, information, decision-making unit participants, conflict/ negotiations) that have an influence on the decision process, and two concepts that partially filter the influence of the factor groups: *decision rules* and *role stress*. Decision rules refer to formal or informal rules and procedures that guide the decision process. Role stress is operationalized as role ambiguity and/or role conflict. Role conflict refers to degree of incongruity or incompatibility among purchase expectations. Role ambiguity is interpreted as lack of information about the expectations related to a purchase, the methods for satisfying known purchase expectations and/or the consequences of role performance [3].

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Appendix The preliminary model of technological investment decision-making

