The Relevance of Results in Interpretive Research in Information Systems and Technology

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Abstract. The rigor and relevance of the results is central to the process of scientific investigation, even in areas where the practice prevails, as is the case of the scientific area of information systems and technology. This issue is also particularly relevant when the underlying epistemological orientation is the interpretivism. Based on a literature review focused on interpretive research in the field of information systems and technology, we find that the generalization of research resulting under the interpretive paradigm are valid and are not exclusive to the positivist orientation. This paper explores the importance of interpretative research in the information systems and technology field. As a result we discuss the different perspectives around the generalization and its interpretation in an interpretative research, supporting the investigator in the grounds of validation of their results.

Keywords: Paradigms of science, interpretivism in IST research, results relevance, generalization.

1 Introduction

The rigor and usefulness of the researched topics are central in scientific research beyond the research process itself. In this sense, these concerns must be managed and aligned with the philosophical assumptions that best fit the way the investigator observes the regularities of the world. We must therefore reflect on the paradigm of the science underlying the research study.

The reflection on these issues assumes utmost importance in areas like engineering, where most of the time the phenomena associated with the use and development of information systems and technologies (IST) are treated. Here, the practice prevails, but the key to that scientific and technological knowledge to be produced is the definition of the research process based on a paradigm of science.

In recent years, scientific studies of the IST field were dominated by the positivist and engineering paradigms. However, the emergence of new research topics that can

G.D. Putnik and M.M. Cruz-Cunha (Eds.): ViNOrg 2011, CCIS 248, pp. 80–89, 2012.

only be fully understood if studied in depth and for longer periods of time, such as organizational and systems design, organizational intervention, management information systems, technology development and their social implications, led to a paradigm shift and emergence of interpretivism in IST field research.

In this paper, presented to the First International Conference on Networked and Virtual Organizations, Emergent Technologies and Tools, we intended to call attention for the study of technological factors inserted in a social context and its impact on the individual, organization and society. These observations are crucial since most of the success factors, or failure, of technology projects are due to human factors rather than technological factors. In sum, we intend to reflect on a number of key issues that render the interpretive research relevant, as a philosophical orientation in the context of IST.

To achieve this objective we defined the following main questions to guide the literature review: (i) What is the influence of the interpretive paradigm research in IST field?; (ii) What issues arise when trying to reflect on the epistemological assumptions underlying the interpretive approach?; (iii) Will the Information Systems and Technologies become an emerging thinking? Emergency in what sense?; (iv)What is the relevance of interpretive research results?

To answer these questions, we started by conducting an exhaustive bibliography of the authors most relevant to the scientific area, identifying curriculum authors, books, book chapters, papers presented at conferences and published articles in scientific journals: David Avison, Robert Galliers, Michael Myers, Geoff Walsham, John Mingers, Richard Baskerville, Rudy Hirschheimer. This literature review was conducted by Scopus, Google Scholar, ISI Web of Knowledge. The documents research was made through the UM catalog, b-on; RCAAP, IEEExplore, Colcat.

Then, based on this extensive bibliography, we proceeded to the identification of the proceeds, the most relevant articles, identifying all those whose title refers to the following combination of words "research paradigms" and / or “information systems and technologies".

In section 2 we present the scientific area of IST as scientific and technological knowledge that emerged from the literature review performed. In Section 3, we discuss aspects related to the IST field as a convergence of knowledge and knowledge network. In Section 4, the discussion goes around the subject of IST field, as a knowledge network. The interpretivism as a research paradigm in the IST field is presented in Section 5. The generalization of results in interpretive research is discussed in Section 6. Finally, we present the conclusions.

2 IST, a Scientific and Technological Knowledge

The advance of science is dependent on how scientists communicate research results effectively to their peers, and, secondly, the willingness of academics not to apply these research results in developing new technologies and practices [1]. Research is therefore one of the most demanding resource of scientific endeavour. Communicating the results is the most extensive part of it. The final result of the activity designated as dissemination of scientific knowledge reflects the views of the scientific results published, hoping that they are applied downstream, helping to achieve a better quality of life, solving the world’s problems.

Science and technology are, thus, an inter-performing cycle, feeding back to each other. The scientist makes intelligible what does the technician, and this, in turn, gives the science instruments and evidences [2].

Research and development (R & D) are human activities that aim to create, expand the frontiers of existing scientific knowledge with the goal of improving action on the world, resulting in a proceeding scientific and light of a particular epistemological orientation [3], [4], [5], [6], [7].

The understanding of science should not be limited and, according to Feibleman [8], we can't assume that science means technology. While science is the scientific knowledge about the regularities of the phenomena of the world determined by a particular paradigm of science (positivism or interpretivism), technology is knowledge on how to act in the world (know-how). The technology is the modus operandi, represented by a group of scientists interested in solving a problem set by the application of theory to practice [8]. According Fleibleman [8], though historically advances in technology have been made without the contributions of science, currently, the technology must be understood as an additional step of applied science, but without meaning to Skolimowski [9] a branch of applied science. It is therefore important to know the progress of technology so you can understand what technology is and, then, understand its meaning, the philosophy of technology (the structure and nature of technology).

Nowadays, technology has emancipated itself in a semi-autonomous cognitive domain. There are many connections between science and technology, but this system of inter-relationships should not be construed as a full dependency. Epistemologically, technology is one way of human knowledge and, accordingly, one must know the forms of relations with other forms of knowledge and not understanding it as dependent ways [9].

In Principia Cybernetica Web (2010), technology is the application of scientific knowledge to build or improve the infrastructure of agriculture, industry and daily life of man, i.e., an action on the world. According Feibleman [8], technology is man's reaction to the nature and circumstances. Produces and applies knowledge of tasks or situations in order to create effective artefacts that are both created and studied, the scientists can contribute to each activity - the design science, an important part of scientific knowledge, focused on the design of artefacts (constructs, models, methods and instantiations) to achieve goals of improving human conditions [10]. We are facing an understanding of technology as a result of scientific technological knowledge, explained by scientific theories and that scientific research can improve practices and real world problems and work [10].

Speaking about the IST, Lee and Baskerville [6], state that this is not just a science but a profession. By the early 80´s, last century, was considered a design activity applied to other disciplines of reference, or contributors disciplines as designation by Lee [11]. Today, despite some problems associated, asserts itself as a discipline of design science, first in a conventional perspective, consuming theories and methods of reference disciplines (contributors disciplines), but have also established itself a reference discipline [12].

At this stage of discussion, the important thing, according Hirscheim and Klein [13], there should be no disconnect between the world of professionals and the

academic world. This concern is shared by Avison *et al* [14] [15], since they believe in the importance of practical research in IST and the impact of IST research in the practice.

3 IST, a Knowledge Network

IST, in terms of scientific area, are, according to McLean [16] and Avison *et al* [15], an inter-disciplinary knowledge, where the contributions to its development come from different disciplines, ranging from computer science, software engineering, organization science, management, economics, ethics, sociology, psychology, statistics, medicine, semiotics, systems thinking, among others. These contributions are identified as the foundation of the IS [14], [11].

According to the tenets of the emerging thinking presented by Santos [17], the IST field presents itself as an emerging thinking, the result of a convergence of knowledge. Baskerville and Myers [12], refers to this movement as a discipline of law (a reference to other discipline areas, particularly those who contributed to the maturity of the IS). The emerging term for these authors is understood not as the convergence of knowledge, but knowledge as a result of input from other areas of knowledge, forming a network of interpretivism emergence of IS research. Walsham [18] refers to this movement as a network of interpretivism in IS.

In recent years, there has also been an increase in contributions from management to IS research while there is a reduction in the focus of study by computer science. This trend shows the evolution of the research focus of the IS. The context of the IS is broad and includes important issues beyond the technology itself to include IS implementation, use, effectiveness, efficiency and their organizational and social impacts [15].

The technology is a significant change agent enabling organizational and individual quality within the organization. Rarely is the factor that limits the design of information systems or the cause of failure. The most likely factors to cause damage, or source of success, such as strategy, communication, control, users resistance are human factors and not technological factors [14].

This broader perspective of the object of study of the IS (the technological factors to human factors) is based on the understanding that this area of study influences and is influenced by a set of interrelated disciplines, the result, also, of the origin and academic formation of their researchers, embracing a plurality of research methods, countering the arguments that the IS field needs its own theory and thought [14][15].

The interdisciplinary and the study from the perspective of different paradigms (positivism to interpretivism) translate into a diversity of spoken problems [19], which according to Avison *et al* [15] make the IS an exciting and diverse discipline and a heterogeneous creative community [20]. But to other authors, this translates to a failure of focus, anxiety and identity crisis, and, accordingly, a confusing field of study, as described by Baskerville and Myers [12], Benbasat and Weber [19], Chekland and Holwell [21] and Davis [22].

As a result of interdisciplinary, Bacon and Fitzgerald [23] call attention to the importance of determining the central focus of IST research: the development, management and use of information for knowledge of work in an organizational

context and of society, in particular, to be supported, or can be supported, enabled or facilitated by the IST. These authors add, moreover, that the science is information about knowledge, citizen satisfaction and performance management, expressed as: (i) nature of the data, information and knowledge; (ii) use of information in organizations; (iii) human-computer interface; (iv) relevance of information, value and costs; (v) data quality; (vi) knowledge management and organizational learning; (vii) semiotics (science that deals with the communication systems in human societies); (viii) IS research, theory and tools.

Avison *et al* [15], although considering understandable the concentration in the core themes of IS, they have the opinion that this view limits the potential of the discipline. The wide range of topics, theories and constructs make the IS a rich and interesting discipline, avoiding that researchers have a narrow vision of the discipline [14]. Understanding the diversity of issues to be tackled is important so that we can establish the relationships between different areas of reference used to explain the phenomena of IST, and so there is greater clarity around the description of this field.

These aspects are important for the IS gain some consistency and establishing itself as discipline [14], a discipline of law, which receives contributions from other sciences, but also that stated as a reference for other knowledge areas by virtue of having interest and value to researchers from other fields of knowledge [12]. It is essential to understand the diversity of theoretical foundations that are established among the various disciplines [19], in a multifaceted process, where researchers in IS, along with investigators from other areas of human potential, create a network of knowledge, of sharing understandings, breaking down boundaries, what Leguizamón calls the convergence of science, but without ignoring the traditional references of IS [12]. Today the IS face a new scenario, they can now serve themselves as a reference discipline for those areas that helped the early statement of IS as a discipline.

Being an emerging field, the scientific area of IST, whereas design science is the construction and evaluation of artefacts (constructs, models, methods or instantiations) designed and built by man to accomplish the purposes of Humans, in search of better Human living conditions in the organizational context, inter-organizational and society [10]. However, according to the authors [10], being the result of research in design science artefacts, it carries within itself some implications: (i) support building (perception, conception and implementation) and evaluation of theories of natural and social phenomena that suffer the impacts of technology; (ii) needs change and also the artefacts they built to meet those needs.

The construction of artefacts has increased, resulting in several phenomena to study. In consequence it becomes important to understand, critically assess the impacts of the artefacts of IST research results, so that building efforts are not wasted in the construction of low-impact artefacts already built.

4 The Interpretivism in IST Research

In the IST area, according to Klein and Myers [24], in recent years have seen the influence of interpretivism, helping researchers to understand the IST in social and organizational context - *"(...) the real world as a context for research (...)"* [14]. The emergence of new research topics, such as systems design, organizational

intervention, management of IS and its social implications were instrumental in the emergence of interpretivism as a paradigm in IS research [18].

There is, currently, the paradigm shift in IS research, from positivism to interpretivism [25].

Positivism in IS research appears in the early periods of the 90's, when the focus of interest was the development of information systems in an orientation closer to computer science and software engineering, a not surprising aspect if we place the birth of IS in the computer science departments [14]. This dominant paradigm, considered by some authors as the paradigm of modern science, has some marks such as: (i) rationality; (ii) reductionism (the simplification paradigm); (iii) mechanistic; (iv) dissociation between subject/object, theory/practice, mind/body, *i.e.,* an objective reality or a real world exists independently of scientific researchers; (v) appreciation of what is quantifiable and scientifically feasible, using mathematics as a tool for validating knowledge; (vi) belief in the discovery of universal laws of general applicability to the functioning of the world; (vii) neutrality and objectivity of the investigator [5][6]. A *"(...) science simplifies the universe (simplicity) to meet him or know how it works (stability), as it is in reality (objectivity)"* [5].

The modern paradigm has provided a profound advancement of knowledge, but with it come new understandings of how scientific thinking and see the world, eventually contributing to the weakening of the pillars which supported itself [17].

Contemporary society is experiencing a transition between the epistemological paradigm of modern science - positivism and postmodern emerging paradigm (where the interpretivism is an expression), for which Santos [17] says are transition periods difficult to understand and go through. A paradigm shift in thinking about the world is lived to which Capra [26] designated the turning point between simplicity and complexity of observed phenomena; the jump from the explanation (hard science) to understanding (soft science) [27]. This brings a new concept of material and nature: instead of eternity, the history; instead of determinism the unpredictability; instead of the mechanism, the interpretation, spontaneity, the self-organization; reversibility to irreversibility and the evolution; the order and disorder; the need, the creativity and the accident. A contribute to a deep epistemological reflection on scientific knowledge [17], triggering, in a postmodern movement, the emergence of a new paradigm, the systemic thinking.

To Klein and Myers [24], investigation, according to this emerging philosophy, assumes that the knowledge of individual reality is gained, only, through social constructions such as language, consciousness, shared meanings, documents, tools and other artefacts. Such research focuses on the complexity of making human sense to the arising situation [28], which attempts to understand phenomena through the meanings that people attach to them [24].

As originally mentioned, the emerging paradigm has influenced the IST research, translated into a variety of problems under study, a variety of disciplines and theoretical frameworks of reference and the diversity of methods and techniques for collecting and analysing data [19].

The interpretivism is, in this respect, hailed as a valid approach for investigating IS in organizations and society, supported by pluralistic methodologies, mostly formed by researchers interested in human and social aspects of research in IS. And even the question of generalization, with all its implications in the acclamation of the research

results, is not only valid in the context of positivism [18]. According to Walsham [29], the nature of generalization is different in the two research paradigms, positivism and interpretivism, but is not owned by just one of them.

5 The Generalization of the Results in Interpretive Research

The Oxford English Dictionary (1998), conceptualizes the term "*to generalize*" as "*form general concepts from particular cases*". Accordingly, the general does not need to have a quantitative or statistical dimension. The standard of statistical generalization based on sampling, as the only valid form of generalization should not be imposed. The statistical generalization is only one among other important notions of generalization. It is necessary to describe the different types of generalization, when methodologically contextualized in a different way. This means, that in a positivist context, generalization means to generalize a theory in different settings where the final result would be the achievement of universal laws governing all observed phenomena [6].

Because of the diversity of contexts in which scientists generalize (science of diversity - positivism and interpretivism), there is a variety of ways of conceptualizing the generalization. Generalization is a commitment from both the sciences, one on the widespread similarities in phenomena (positivism), other on the widespread differences in the phenomena (interpretivism) [6].

Considering the importance of the question, for the reasons and justification of the research results presented, it is considered appropriate to present, even if briefly, the framework presented by Lee and Baskerville [6]. These authors identify the different ways of generalization supporting, in that sense, the researchers, particularly those in the area of IS, to claim the generalization of their research results and thus their relevance.

An important aspect in the framework building is the distinction, in different notions of generalization, between theoretical statements and empirical statements. The empirical statements refer to data, measurements, observations or empirical descriptions or real-world phenomena. The theoretical statements posit the existence of entities and relationships that cannot be directly observed and, accordingly, can only be theorized. Both kinds of research, positivist and interpretive, deal with empirical statements (resulting from the observation of the investigator); they also include statements regarding the theory that the researcher uses to explain the observed phenomena [6]. Another important aspect is the differentiation between what the researcher generalizes from (generalizing from) and that the researcher is generalizing (generalizing to).

With reference to the definition of generalization, as provided in the Oxford English Dictionary, this can refer to the generalization from (generalizing from) particular cases to general notions (generalizing to), and the generalization from (generalizing from) a theory for the generalization (generalizing to) different configurations (generalizing to) [6].

Combining these two aspects, Lee and Baskerville [6] recognize that generalization can occur in four ways: (i) from empirical statements to empirical statements; (ii) from empirical statements to theoretical statements; (iii) from theoretical statements to empirical statements; (iv) statements from theoretical to theoretical statements.

Table 1. Framework of generalization

	Generalizing to empirical statements	Generalizing to theoretical statements
Generalizing from empirical statements	***EE*** Generalizing from data for descriptions (measurements, observations, and other descriptions)	***ET*** Generalizing from empirical descriptions (measurements, observations, and other descriptions) for the theory
Generalizing from theoretical statements	***TE*** Generalizing from theory to empirical descriptions Generalizing a theory confirmed in a different field to another field descriptions.	***TT*** Generalizing from concepts to theory. Generalizing a variable, or construct another concept for a theory

Font: Lee & Baskerville, 2003:233.

In consequence, the authors argue that the result of generalization (the general notions) can be theoretical statements or empirical demonstrations and the inputs for the generalization (instances, the particular cases) may also be theoretical statements or empirical claims.

Walsham [28] makes an illustration of the four types of generalizations using concrete examples, which are seen as explanations of particular phenomena derived from empirical interpretive research in specific settings in IS that may be useful in the future to other organizations and contexts.

6 Conclusion

It has been seen, in recent years, to an influence of interpretivism as epistemological orientation in IST research against of positivism. This research paradigm shift results, in part, from the emergence of new interest topics to the area of IST, namely the organizational and systems design, organizational intervention, management of information systems and their social implications. In this sense, there were several references in the literature that allowed answering the questions initially raised: (i) What is the influence of the interpretive paradigm research in IST? (ii) What issues arise when trying to reflect on the epistemological assumptions underlying the interpretative approach?

With the changing of point of interest of IST, we are witnessing a new form of the researcher to observe these objects of interest: to understand and critically contribute to the greater adoption and use of technology aimed at improving the living conditions of individuals, organizations and with impact on society.

Hirscheim and Klein [13], consider important this inter-relationship between the world of professionals and academia. Avison *et al* [14][15] highlight the importance of practice in IST research and the impact of IST research in practice.

Considering this perspective, in which scientific research can improve practices and real world problems and professional [10], we are witnessing an understanding of technology as a result of scientific technological knowledge, explained by scientific theories. Research in IST is based on theories and methods of reference disciplines (disciplines contributors), but it is itself also a reference discipline for other fields of study, especially those who contributed to its maturity [12][11]. The knowledge that results from input from other areas of knowledge translates into what Baskerville and Myers [12] describe the Emergence of Interpretivism in IS Research, which Walsham [18] calls its network of school interpretivism in IS. Are thus several references in the literature that supported the view around the question initially posed: (iii) Are the Technology and Information Systems an emerging thinking? Emergency, in what sense?

In any process of scientific research, the reasons for the viability of the results obtained are central thing, and as such, concern is also felt by researchers in the field of IST. This is particularly relevant when the underlying epistemological orientation is interpretivism. It soon raises doubts or criticism from the defenders of positivism, which argued in its favour only the generalization of results and, accordingly, the viability of them. Based on a literature review conducted, we reach the conclusion, reasoned that the generalization of research results under the interpretive paradigm are valid and not exclusive to the positivist orientation. Can be found, therefore, in reference literature explanations and arguments about the generalization of research results under the interpretive paradigm allowing, thus, answering the question initially posed: (iv) What is the relevance of interpretive research results?

There are a variety of ways of conceptualizing the generalization. Generalization is a commitment from both sciences, one on the similarities in widespread phenomena (positivism), one on the widespread differences in the phenomena (interpretivism) [6].

In sum, this article explores the importance of interpretative studies in the area of information systems and technology, highlighting the arguments presented by researchers around the generalization of the results and, accordingly, the relevance and validation.

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