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Critical Realism in Transdisciplinary Information Systems Theorizing

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Abstract

Information Systems (IS) and the process of distinguishing Information Systems ontology have been the center of challenge during the 50 years of IS development. The importance of this challenge is emergent in direct link between knowledge development process in IS and the IS ontology. In other words, theorizing and efforts to falsify theories, which have been developed, is influenced by the way IS ontology is approached. Critical realism enjoying the unique approach to the IS ontology based on transcendental realism and critical naturalism can be a useful basis to establish the transdisciplinary view in the process of IS knowledge development.

This point of view is important regarding the role of human agent in different layers of the IS ontology as a result of its transcendental ontology. Critical realism develops human role during next stages of knowledge and the methodology development based on the transdisciplinary view to IS. The explanation of a transdisciplinary view to the IS ontology regarding the unique role of human agent in the process of theorizing and knowledge development in Information Systems is presented in this article.

Keywords: Information Systems, Transdisciplinary view, Critical Realism, Theorizing

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1. Introduction

One of the basic questions, emerged among researchers regarding development of Information Systems concept in recent decade, is: "Can the concept of Information Systems be considered as a science or a profession?" (I. Benbasat & Weber, 1996). Following this question, if they are supposed to have a scientific nature, how will the Information Systems be scientific? (D. Robey, 1996). If the Information System can be organized as a scientific discipline, what are its principles? (Culnan & Swanson, 1986), and what are its theory foundations (Furneaux, Wade, & Ali-Hassan, 2007)? During recent years, many researchers tried to answer the questions about this issue, which forced them to return to Information Systems' roots and philosophical basis and also examine these questions in terms of different paradigms of Information Systems research (J. Mingers & Willcocks, 2004).

According to Kuhn's point of view (1970), a paradigm ascendency in science structure has always come along with destructive effects and deviation from the truth. According to Kuhn's definition, a paradigm is a set of fundamental beliefs, which is illustrated in ontology, epistemology and methodology (Rezvani, Hoseini, Azar, & Ahmadi, 2009).

Critical Realism, employing a new approach to ontological, epistemological and methodological issues, tries to deal with the positivist scientism and also relativism and idealism reactions against interpretivism (a. Mingers, J., , 2004). The core of Critical Realism is based on the idea that causal language can be used to explain the world's events. It argues that the nature of social science clarifies the reality of social entities and knowledge is a social and conceptual emergence that the criticism against its concepts used to reveal the world is essential for its development.

Regarding the entrance of social theories to Information Systems field based on transdisciplinary view and the capability of critical realism to explain social events by causal language, critical realism can be mentioned as a basis for interacting with the problem of identifying the ontology of Information Systems. It also facilitated the process of theorizing and knowledge development in Information Systems field (Fleetwood & Ackroyd, 2004).

Based on what is said, this article follows a new approach to use critical realism as a powerful methodology to

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describe the transdisciplinary ontology of Information Systems. Considering the importance of selecting a research methodology, compatible with the nature of research problem, the choice of critical realism as a research methodology has an important role in defining the hierarchical ontology of Information Systems and the way the knowledge of Information Systems is developed. After the introduction, challenges of categorizing Information Systems in scientific and professional fields and the theories stated in the mentioned field are discussed. A transdisciplinary view of Information Systems is reviewed here to deal with challenge of categorizing Information Systems. The third part assesses the transdisciplinary ontology of Information Systems employing critical realism. In this way, the functionalities of critical realism in a transdisciplinary view of Information Systems are discussed. Then based on the introduced functionalities, the structure of theorizing in critical realism is evaluated as a research methodology, which is formed, based on the transdisciplinary ontology of Information Systems. The forth part is dedicated to discussion and conclusion.

2. Challenges of Classifying the Information Systems in the Professional and Scientific Level

Advancement in Information Systems concepts and development methodologies has caused a challenge to develop in the 1990s, in terms of categorizing the concept of Information Systems, which has been developed for 4 decades as a scientific discipline or a professional activity.

Discussions on this challenge can be analyzed through (Chrisanthi Avgerou & Cornford, 1995; C. Avgerou, Siemer-Matravers, & Bjorn-Andersen, 1999; Avison & Nandhakumar, 1995; I. Benbasat & Weber, 1996; Iivari, 1991; Markus, 1999) studies. The challenge of categorizing the concept of Information Systems has raised so many other questions about Information Systems ontology such as:

- Is it possible to introduce and determine Information Systems scope? (Markus, 1999).
- What are the disadvantages of not introducing and determining the scope of Information Systems (Currie & Galliers, 1999)?

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- Is it possible to define Information Systems as an independent scientific discipline (I. Benbasat & Weber, 1996)?
- By determining Information Systems as a scientific discipline, how is it different from other scientific disciplines (D. Robey, 1996)?
- What is the relation between Information Systems scientific discipline and the profession of Information Systems (Iivari, 1991)?

Raise of questions as mentioned above can be considered as a sign of crisis in defining Information Systems identity (Adam & Fitzgerald, 1996; Chrisanthi Avgerou, 2000; Izak Benbasat & W. Zmud, 2006; D. Robey, 1996; Daniel. Robey, 2003). According to the regarded questions, there was a wide range of answers published in different forms of essays and books.

Lamp and Milton (2005) have organized researchers' opinion about Information Systems ontology from 1980 to 2004. The summary of Lamp and Milton research results is described in table 1.

Furneaux et al., assessing 102 articles published in MIS Quarterly between years 2000 to 2006, have pointed out that Information Systems field enjoys a wide range of theories, which have been entered into the field of Information Systems and have had a remarkable diversity (Furneaux, et al., 2007). Based on this study, the range of reference fields, which have been used by Information Systems researchers in theorizing Information Systems includes computer science, organizational behavior, marketing, economy and business strategy. The frequency and percent of usage of theories in the field of Information Systems is illustrated in table 2.

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Table 1: Reviewing the Researchers' Opinion about Information Systems Ontology (Lamp & Milton, 2005)

Point of View	Reference
It is not possible to comment on the Information Systems ontology as an independent scientific discipline.	Ives, et al.1980; Seddon, 1991; Shanks, et al., 1993; Parker, et al., 1994; Holsapple, et al., 1994
The Information Systems are affected by different scientific disciplines and it is hardly possible to imagine an independent nature for them.	Keen, 1991;Seddon, 1991; Avison, 1993; Holsapple, et al., 1994; Parker, et al., 1994; Walczak,1999; Galliers, 2004
Information Systems are taught in different universities, which imply the dependency of this discipline.	Avison, 1993; Holsapple, et al., 1994
The Information Systems are weak in terms of theory. It is not possible to examine Information Systems based on an independent and a strong theory.	Keen, 1991; Avison, 1993; Straub, et al., 1994;Gregor,2002
In practice, Information Systems are used as a practical and professional discipline and not as a scientific one.	Hurt, et al., 1986; Keen, 1991; Avison, 1993,Shanks, et al., 1993
There are lots of methods, models and frameworks used in Information Systems field. This diversity implies the Information Systems' lack of independent scientific basis.	Ives, et al.,1980; Avison, 1993, Shanks, et al., 1993; Holsapple, et al., 1994; Parker, et al., 1994; Straub, et al., 1994; Baskerville and Wood-Harper, 1998; Fitzgerald and Howcroft,1998; Galliers, 2004

Table 2- Theories used in Information Systems Research Based on (Furneaux, et al., 2007)

Theory	Frequency	Percentage
Expectancy- confirmation	4	%3.9
Institutional	6	%5.9
Resource Based View	8	%7.8
Structuration	4	%3.9
Technology acceptance Model	6	%5.9
Planned Behavior	4	%3.9
Rational Action	4	%3.9
Other	66	%64.7
Total	102	%100

As shown in table 2, Information Systems researchers have followed a reductionist view to approach Information Systems transdisciplinary field and employed a diverse attitude in knowledge development processes. The transdisciplinary view to the field of Information Systems affects this diversity in evaluating different theories and organizes them to reach a remarkable advance in theory development by

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accumulating the achieved advances and by enjoying a wholly view.

2.1. Mixed and Multidimensional Approaches in Information Systems

Considering what is introduced about the debates on organization of Information Systems and its state of being a profession, it can be discussed that the categorization of Information Systems discipline as a scientific one cannot comply with realities of Information Systems domain and make it clear as enough. This is because of multiple divergent approaches, methods and dimensions, which can be regarded in the process of Information Systems ontology assessment. As a result, there would be an extreme need to follow a mixed approach to consider the multi-dimensional ontology of Information Systems and employing the transdisciplinary view will be an aligned approach to the mixed approach.

2.2. Transdisciplinary Approach to Information Systems

The phrase, "Transdisciplinary", has been used to define the Information Systems by Galliers (2003). The transdisciplinary concept has been used to refer to new disciplines, which are the results of integrating sub disciplines of old sciences. The transdisciplinary science has been emerged because of excessive dependence of a research discipline questions on achievements of the other research disciplines (that causes complexity and integration of questions between those two disciplines or several disciplines and overflow of questions and answers between them) (Peighami & Turani, 2009).

Based on Galliers (2003) transdisciplinary approach towards Information Systems, Information Systems boundaries extends from the organization to the society. This extension of boundaries not only means physical extension, but also shows the entrance of mentioned issues to social dimensions and the Information Systems affections on social aspects. The transdisciplinary approach will cause systems to be influenced by social theories and the entrance of these scientific disciplines' theories to the Information Systems happens through the expansion of its boundaries to sociologies issues (Galliers, 2003).

In other side, in Galliers (2003) view, the core subject in Information Systems is not only dedicated to its technological dimension, but also is based on information

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and human agent, due to its overlapping boundaries with sociology issues.

Galliers (2003) believes that the transdisciplinary approach will widen Information Systems domain from organizational level to the society level. Based on what is described, instead of depending Information Systems to disciplines such as computer science, Galliers defines it as a reference scientific discipline, identifying the characteristics of which is vital.

He believes that the Information Systems' transdisciplinary characteristic leads to its reinforcement by acquiring scientific and theoretic basis from other disciplines. This point of view is important because of second dimension of this approach, which threatens the scientific independence of Information Systems (Galliers, 2003).

The characteristic of transdisciplinary approach to the Information Systems based on Galliers (2003) is illustrated in the table 3.

Table 3: Characteristics of Transdisciplinary Approach to Information Systems in Comparison With Disciplinary Approach (Galliers, 2003).

	Transdisciplinary	Disciplinary
Boundary	Society	Organization
Main Theme	Information/People	Information Technology
Boundary	External part	Internal part
Scope	Wide	Narrow
Reference Discipline	Information Systems	Computer Sciences
characteristics	Vital	Definite
Interdisciplinary	Opportunity	Threat

3. Transdisciplinary Ontology of Information Systems by Critical Realism Approach

The transdisciplinary view of Information Systems requires a description of defined basics in the fields of ontology, epistemology, methodology and theorizing. As described before critical realism, which has been selected as a research method, has the capability to describe this transdisciplinary view of Information Systems. So in the first part, the basics of critical realism are introduced and in the

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next step, its accomplishments in establishing a transdisciplinary view of Information Systems are illustrated.

3.1. Critical Realism Foundations

Critical realism assumes a transcendental realism in ontology and an interpretivist view in epistemology (a. Mingers, J., , 2004). Major objectives of critical realism can be illustrated as the following items:

- Establishing a transcendental realism in ontological domain and the relativism approach in epistemological domain, which introduces knowledge as a phenomenon that its conditions do not arise in people's minds, but in the structure reality (a. Mingers, J., , 2004).
- Discussion about critical naturalism in social science domain Realism is a doctrine for epistemology which believes in knowledge as an effort for illustration of reality. In its point of view, there is a world, which is independent from people's knowledge from it. In other words, the reality cannot be reduced to the universal mind. The world's independence from knowledge doesn't mean that it can be reached as simple and direct. It imposes a more complicated relation to the world (Fleetwood & Ackroyd, 2004). Although there are different kinds of realism, but all of them follow a basic principle which introduces the ontology independent from universal mind (Marcum, 2008).

3.2. Critical realism methodology to discover the transdisciplinary ontology of Information Systems

As mentioned earlier, the transdisciplinary view of Galliers (2003) to Information Systems will expand the boundaries of this field from organization to society. In Galliers' (2003) transdisciplinary view to the Information Systems, the significance of the matter is not only the technological dimension, but also the people and information which results in a multi-dimensional approach and not a single directed point of view.

Based on what is previously described, the Information Systems researches suffer from some kind of diversity and subsequently the analyses performed in this field require some kind of integration to decrease this diversity in Information Systems ontology and the way knowledge

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is developed.

The process of discovering transdisciplinary ontology of Information Systems can be implemented by deploying a transcendental realism in ontology. The mentioned process aligned with considering the technological side of Information Systems as part of the core subject can change researchers view to the Information Systems. By changing the old view, researchers can relieve from the current diversity in the analysis of phenomenon of Information Systems resulted by the island form of theories and the difference in level or layer of approaching Information Systems.

By deploying a transcendental view on transdisciplinary approach to Information Systems, the theories and analyses represented in different layers of the Information Systems field can be integrated. For the purpose of analyzing different emergent layers in each domain of Information Systems, it should be noted that the acting agents, which are the origins of these ontological layers, are human agents who have a special kind of interaction with technological agents. So the following illustrates different properties of the human agent, its unique role in development of knowledge of Information Systems and the role of technology in transforming the social phenomenon.

Role-playing of human agent in interaction with Information Technology and in Information Systems frame is widely under affection of complex network of biological, chemical, physical and ecological agents. This play is emergent, based on the different layers of ontology critical realism approach (Dickens, 2003). So employing a transdisciplinary approach to Information Systems can lead to more powerful analysis of Information Systems events with regard to different layers of emergent phenomenon by interaction between human agents and Information Technology. In this way, the consideration of psychological properties of human agents towards Information Systems is a special dimension, which can direct Information Systems knowledge development. The important point to be considered in the analysis based on the transcendental realism is that a few changes in each level of the transcendental nature of human agent can lead to remarkable changes in the upper and lower layers of Information Systems nature. So the explanations based on the critical realism to describe the Information Systems

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phenomenon use their transdisciplinary view to causally explain the evidenced events (Easton, 2010).

Theorizing in Information Systems based on the critical realism approach requires the recognition of the elements of causal explanation. Causal explanation is performed when the observed event falls in a causal order and its probable different causes are defined. With regards to the fact that the critical realism explanation is emergent in two dimensions, including causal mechanisms and special conditions of functioning causal mechanisms (Easton, 2010), the definition of the conditions for any event to happen in the field of Information Systems in a desired way and describing the properties of causal mechanisms which are active in any event in Information Systems are of main concerns in realism approach. In many cases there are differences in research outcomes, which can be explained only, based on the required conditions and cannot be referenced to special active causal mechanisms. So the recognition of active causal mechanisms in each layer of Information Systems strata and also the required conditions for performance of these causal mechanisms, including biological and psychological causal mechanisms up to social and cultural causal mechanisms has a remarkable role in theorizing and knowledge development in Information Systems.

To explain the events which are observed in Information Systems, in the first step, the layer in which the event has occurred is required to be considered. Then, the assessment of ontological relations between it and other layers, below and above, in terms of active causal mechanisms in each layer and translayer and inlayer effects of them will be so important. By employing these philosophical basics in analysis of emergent phenomenon in Information Systems, the reduced approach will be avoided and a wholly approach will be followed regarding the lack of capability to investigate the system similar to the way natural systems are investigated.

Determination of active mechanisms in each layer of hierarchical ontology of Information Systems will be possible in a wholly approached context and based on mechanisms being active from all natural layers. The point to be mentioned in this analysis is the role which functional environment of Information Systems play

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and the mutual affection which these systems communicate with their environment.

Based on the critical naturalism attribute of critical realism, in analyzing the ontological dimension of Information Systems, there is a need to emphasize on social structure resulted from interaction between human groups, information technology and information as dependent on the constituents, generators and regenerators of these structures. Social structures emerging from interaction between mechanisms and active entities in Information Systems can enable social interaction of these entities and also are produced and reproduced by these activities. So these structures are a result of social activity. At the same time, physical, psychological and biological attributes of the human agent have the core role in interpreting and recognition of the meaning of performed actions. Finally, psychological and biological attributes of theses human agents in lowest level and their cultural attributes in highest level, will affect to somehow social structures of Information Systems.

Another point about the ontology of Information Systems and at the same time about knowledge of Information Systems is the transitive dimension of these systems. The ontology of Information Systems is affected by active mechanisms in different layers of it. These mechanisms interact with biological, psychological, cultural and human agents. A difference in ontological processes of each layer connected with human agent can result in a change in ontological processes of other layers, including lower and upper layers, and concluding to emergence of transitive ontology of Information Systems.

Knowledge development in Information Systems is introduced as a social process, which performs to produce developed knowledge from transitive objects of Information Systems based on theories and existing knowledge (based transitive objects). The point to be mentioned in this analysis level is the dependency of Information Systems ontology to Knowledge development processes, which results in change in the ontology of Information Systems in cultural, political, economic and social layers by a little change in basic processes. In other words, the ontology of Information Systems is influenced by epistemological processes and Information Systems knowledge

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development. So, the ontology and epistemology of Information Systems is developed under the influence of epistemological process in the historical and social line.

The transdisciplinary view to the Information Systems ontology based on critical realism lowers the reductionist approach to Information Systems. It avoids the postmodernist view, which relates the main role in Information Systems ontology to emergent discourses and the positivist view which doesn't mention human interactions and developed discourses in the ontology of Information Systems (Dickens, 2003).

Based on what is mentioned, the constituents of transdisciplinary domain of Information Systems can be identified as follows with regard to the critical realism approach:

- The biological system of human being
- The psychological system of human being
- The unofficial social-organizational system which develops discourses and group interactions The official social-organizational system based on the regulations, organizational limitations and defined roles
- The official system of information technology including transferred activities from human domain to technological domain because of the potential to be official
- The unofficial system of information technology and the human agent's unofficial use of official infrastructures
- Social organizational system developed by human agents interactions and at the same time interaction with technology
- Cultural-political-economic system, produced and reproduced by the human behaviors in social organizational systems and based on biological, psychological attributes of people and their learning capacities

Figure no 1 illustrates the hierarchical ontology of Information Systems.

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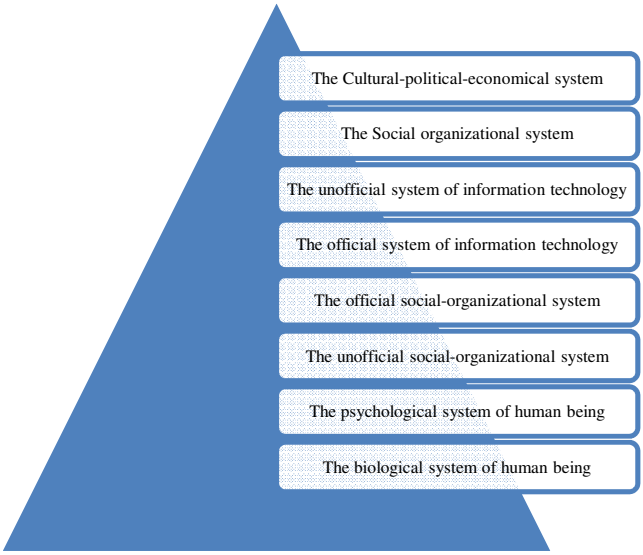

Figure 1 - The Hierarchical Ontology of Information Systems.

With regard to transcendental realism in ontological domain of critical realism and the acceptance of relativism in knowledge development as emergent based on historical and social conditions in the epistemological domain (a. Mingers, J., 2004), knowledge development in Information Systems domain can be performed based on transcendental ontology described in figure 1 and considering epistemological doctrine, which clarifies the knowledge of Information Systems as an effort to illustrate the reality of Information Systems. It should be noted that this reality of Information Systems is independent from researcher's knowledge from it. In other words, the reality of Information Systems is not reduced to the human agent's mind. From the view of critical realism, the researchers' knowledge from Information Systems is emergent by discourses performed in these systems and as a result, analyzing the knowledge of Information Systems is not possible beyond these discourses. At the same time, the experience of fallibility of developed theories in Information Systems domain is a sign of the state of Information Systems for being independent from developed discourses about it and somehow a feedback from how close these discourses are to transcendental ontology of Information Systems.

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In developing scientific knowledge from transcendental ontology of Information Systems, metaphors can play an important role to describe emergent phenomenon in different layers of transcendental ontology of Information Systems. So, the constructs established by human agents to discover the reality of Information Systems have to be a construct from an identified phenomenon (Dickens, 2003). This is possible by identifying a real world, including the reality of Information Systems which these metaphors refer to it. In this way, Information Systems can be recognized as a phenomenon to be identified. It should be noted that mentioning the state of being performative has an important effect on the process of ontology identification. We also can use metaphors to develop Information Systems theories as a creative instrument. This instrument will be useful until the researchers can reach a performative understanding. But if the instrument cannot perform as desired, its use has been in a wrong way (Easton, 2010). By other side, the way human agent looks at the metaphors and language applications will also play a role as an entity with causal power in transcendental Information Systems ontology and result in physical and real remarkable influences. The concepts used by researchers to identify the ontology of Information Systems are affected by political, social and economic processes and in practice will change the ontology of Information Systems in different layers. The kind of approach to biological and psychological capacities of human agent and its way of interacting with political, social and economic environment and way of mutual affection with environment will also play a role in processing development theories of Information Systems.

3.3. The Structure of Theorizing in Information Systems Based on the Critical Realism Approach

As mentioned earlier, considering that the phenomenon of Information Systems and its applications happen in different strata of its ontology has a considerable role in the process of theorizing in Information Systems. The emergence of these strata is the result of the two dimensional aspects of Information Systems including human and technology and their interaction to come with new attributes in Information Systems domain. So the advances in theorizing and knowledge development in Information Systems domain have been affected to a

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great extent by these ontological strata of Information Systems.

This approach to Information Systems ontology respects all different efforts to develop Information Systems theories as an integrated whole and defines as wholly integrated hierarchy of Information Systems ontology. Information Systems theories, which increasingly have considered different strata of Information Systems, have tried to see the ontology of Information Systems from their own perspective and discover the affections of individual, group, organizational, social and cultural interaction of human agent with Information technology as a separated island (Furneaux, et al., 2007). As a result, the advances acquired in the field of theorizing in Information Systems, are the result of theorizing advances in any stratum of Information Systems ontology. This theorizing can be performed in different levels from Individual domain and psychological, biological affections by human and technology interaction to Eco systemic, cultural, political and economic human and technology interaction in organization and society.

Following a transdisciplinary approach to Information Systems, based on critical realism philosophy, provides the researcher the opportunity to develop convenient theories in a view upper than of one individual stratum or scientific domain which can be part of Information Systems. Based on the critical naturalism dimension of critical realism and in the epistemological point of view to Information Systems, knowledge development in Information Systems development process and applications and considering theorizing in individual, psychological, social and cultural levels is following the pattern of open interactive social systems. So, the assessment of developed theories in respective domains is not possible. This is also because of dependency of emerging prospective effects to many agents (a. Mingers, J., 2004). Indeed, in the transdisciplinary view derived from critical realism methodology to Information Systems, the main concern is the explanation capability of theory instead of its prospective capability. In case of unsuccessful efforts to falsify the explanation capacity of a theory in any stratum of Information Systems ontology,

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the theory has the potential to be converted to a basis for theory development relating to any stratum of the Information Systems phenomenon and beyond the mentioned event in Information Systems domain.

Following a socio-historic view to Information Systems ontology and epistemology results in following a socio-historical approach in theorizing processes in Information Systems. These theories as mentioned earlier are based on causal explaining of evidenced events in Information Systems domain. These explanations consist of entities, the causal power of these entities, the relation between affected entities by these causal powers, the resulted events from entities interaction in different layers of ontology and the context of evidence happenings (Easton, 2010).The identification of active entities in Information Systems -as basic theory constituents for critical realist explanation- includes items such as organization, human beings, relations, approaches, resources, creations, ideas and similar cases. In other words, every introduced layer in transcendental ontology of Information Systems can activate representatives in different domains. The kind of these representatives can be human, social, material, complex, simple, structured or semi structured, which illustrates the main nature and capacities of objects. The belief to causal power in active entities in different strata of Information Systems ontology locates beside other believes of researches active in theorizing and the total structure of these believes must be integrated as a scientific system. So that the concentration on questions like the following has a remarkable role in theorizing process and Information Systems knowledge development:

- What kinds of entities form the field of Information Systems research?
- What are the relations between entities in different strata of Information Systems These relations can be established between recognized entities from one stratum or between different strata and so that the relation identification between defined entities from similar or different stratum can be noted as a main part of Information Systems knowledge development process. The entities of Information Systems can have many relations, which present

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identity to other entities as well as themselves. Changes in an entity results in entity changes related to that in similar or different levels. Transdisciplinary researches in based on critical realism methodology in Information Systems domain constructs theories on the basis of several concepts, which points to certain entities and illustrates their relations until it can reach a defined framework. The researchers of Information Systems domain, to modify these theories, are dependent on the relations between identified entities of Information Systems (Easton, 2010). Changes in one entity conclude to changes in another entity and this change doesn't follow any regular basis. This change also can change the nature of one entity belonging to a certain strata of Information Systems ontology.

Finally, scanning the events in any stratum of Information Systems transcendental ontology can be defined as a starting point to identify entities, their relations and the causal power of an entity to perform in a context including different layers of Information Systems ontology. These events can be categorized as external behaviors of individuals and systems (Easton, 2010). From the other side, the expectation for evidence and its lack of appearance can also be a basis to identify causal mechanisms which neutralize each other's causal power to prevent evidence sign recognition.

By developing realist explanations about Information Systems phenomenon and reinforcing developed theory based on these explanations, there will be an urging need to examine the relation between developing theory and existing theories. If there are limited numbers of developed theories in the mentioned field, the theorizing process will have less demand to be compatible with other theories. It should be noted that if there are several theories in the considered domain, there will be a possibility to develop certain aspects of a theory including entities, their causal powers, the nature of relations among entities and connected mechanisms. So, before the beginning of the research process, certain dimensions of theories which can be improved should be defined.

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4. Conclusion

Based on what is discussed, the need to identify the identity of Information Systems is a mandatory affair to illustrate the ontological issues of Information Systems and recognize related phenomenon to deal with introduced challenges. The article has made efforts to employ the methodology of critical realism philosophy to discuss the ontology of Information Systems.

In the research mentioned, to establish causal explanations, regarding transcendental ontology of Information Systems, active mechanisms in different strata and their relations with biological, psychological, social, cultural and human based agents have been considered. Based on the research performed, it is illustrated that a change in ontological processes of other strata of the mentioned domain can result in changes in ontological processes of any other strata of Information Systems ontology. A multi-layer approach to the Information Systems ontology provides a basis for knowledge development in Information Systems, which tries to reduce the reductionist approach to Information Systems and makes convergent large collection of theories in the field of Information Systems. This kind of approaching the Information Systems knowledge considering the transitive ontology of these systems has a remarkable affection in changing knowledge structures and epistemology of Information Systems and finally results in changes in different strata of Information Systems ontology.

Based on what is illustrated in the mentioned research, successful theory development in Information Systems domain is dependent on following a Transdisciplinary approach, derived from critical realism methodology. This approach reduces the wide divergence of Information Systems theories, which try to describe a phenomenon from a certain point of view and aligns the wide different theories providing a wholly approach to the Information Systems ontology.

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رئالیسم انتقادی در نظریه پردازی فرارشته ای سیستم های اطلاعاتی

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سیستم‌های اطلاعاتی و شناخت هستی آن به عنوان یک علم یا حرفه در طول تاریخ پنجاه ساله رشد و توسعه سیستم‌های اطلاعاتی، محل مناقشه محققان این حوزه بوده است. اهمیت این مناقشه را می‌توان در وجود ارتباط مستقیم بین تلاش برای توسعه دانش در حوزه سیستم‌های اطلاعاتی و شناخت ماهیت و نگرش اتخاذ شده در خصوص هستی سیستم‌های اطلاعاتی، جستجو نمود. به عبارت دیگر تئوری پردازی و تلاش برای ابطال تئوری‌ها در راستای توسعه دانش سیستم‌های اطلاعاتی کاملا متاثر از نوع نگرش به هستی آن خواهد بود. رئالیسم انتقادی با نگاه منحصر به فردی که به هستی سیستم‌های اطلاعاتی مبتنی بر دو محور رئالیسم لایه بندی شده و طبیعت گرایی انتقادی دارد، به عنوان یک روش شناسی مبنای مفیدی برای پایه ریزی نگرشی فرارشته‌ای در توسعه دانش سیستم‌های اطلاعاتی فراهم می‌آورد.

این نگرش از آن جهت اهمیت دارد که به عامل انسانی در لایه‌های متفاوت وجودی سیستم‌های اطلاعاتی که متاثر از هستی لایه بندی شده آن است، نقش تعیین کننده‌ای نسبت می‌دهد و حضور این نقش را تا گام‌های بعدی در حوزه توسعه دانش و روش‌شناسی مبتنی بر نگرش فرارشته‌ای به سیستم‌های اطلاعاتی حفظ کرده و گسترش می‌دهد. در این تحقیق تلاش شده است تا نوع نگاه فرارشته‌ای به هستی شناسی سیستم‌های اطلاعاتی و نقش عامل انسانی و اثرات آن در راستای تئوری پردازی در سیستم‌های اطلاعاتی تشریح شود.

واژگان کلیدی: سیستم‌های اطلاعاتی، نگرش فرارشته‌ای، رئالیسم انتقادی، تئوری پردازی.

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