

How Territorial Knowledge Effects on the Sustainable Development within Companies

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Abstract: Nowadays sustainability is issued to industries in order to integrate it into their activities for sustainable development. Studying of territorial resources impact on industrial activities and decision makers' information when considering sustainability. The aim is to enhance the knowledge of actors in the industries in relation to territorial resource through sustainable objective. Moreover, considering how this knowledge can help to the different level of industry in regard to value creation for human and decision making. This consideration is done by categorizing of territorial knowledge and linking them with other classes and industrial organization.

1 INTRODUCTION

Company, industrial ecosystem and territory are complex system in interaction that are organized to their own specific goal. Although, this objective is usually divergent, sustainable development can be common target for these embedded systems. So, the companies integrate sustainable issue into their activities for sustainable development (Zhang et al., 2013). Sustainable strategy cannot be considered an independent issue: it should must be integrated into corporate global development. This integration needs to support sustainable goals to be in line with other existing global corporate tendencies and constraints (Hallstedt et al., 2010). Recently, there is a shift to integrate territorial resource into product development process of companies in a sustainable perspective (Allais et al., 2015). Territory is introduced as a place, where decisions are made and where stakeholders gather around common questions (Nitschel et al., 2016). Ontology is as suitable method for representation of dispersed knowledge of tangible and intangible resource of territory in sustainable perspective of companies (Wijesooriya et al., 2015). The main challenge for companies is integrating of territorial resource and sustainable issue to their activities that its management remain a great challenge (Zhang et al, 2013, Allais et al, 2015).

Some of literature suggest that one of the principal issue is capture of knowledge about its territories for integrating into company activities toward sustainability (Vadoudi et al., 2017, Allais et al., 2015). In addition, lack of knowledge about the territory's features and their integrity are barriers for searching a possible concept for sustainability.

This research propose is an ontology based of territorial knowledge to improve company sustainable performance at different level through organizational innovation. It argues on the type of territorial knowledge that help to the industrial organization. Then, it argues how this knowledge are linked together and help to which hierarchical level of company.

2 SUSTAINABILITY

Sustainability issues affect every component of our society from individuals to regional and global organizations: major ecological or social crises are due to natural resource overconsumption and rising inequality at both local and global scales.

The growing attention given to sustainable development is encouraging companies to integrate sustainable issues into their activities. Sustainable aspects should be embedded at all corporate from global strategic decisions by top management, through planning by tactical management, to daily

engineering and production activities of the operational area (Zhang et al., 2013). To do so, the company needs to carefully and reasonably break down “sustainability” into several actions or attributes to help its comprehension (Hallstedt et al., 2010). For this reason, in our work an anthropic definition of sustainability with 5 dimensions has been adapted (Figuiere and Rocca, 2008). Sustainability objectives focus on the human development (social sphere). The environment is considered as the limiting factor for anthropic activity (ecological sphere). The economic sphere is considered as means which enable the realization of social objective with respect to ecological boundaries. The political sphere is considered as the place for public debate and long-term societal orientation and decision making; i.e. the coordination of sustainable industrial organization and expectations from civil society. The territorial dimension should be taken into account, adapting global policy to local specificities to develop appropriate solutions. So, organizational capability in the companies which can be used to support the system innovation toward five dimensions of sustainability (Allais et al., 2017).

Territory is considered as value creation network, where all of intangible and tangible resources flow. Consequently, territorial integration required organizational innovation into company activities (Allais et al., 2015). A territory is an evolving and complex combination of a set of actors in which human activities occur and the geographical space that these actors use, landscape and manage (Moine, 2006).

Thus, it can be concluded that territory consist all of intangible and tangible dimension of sustainability to help the organizational capability in the company to create the value for the human.

3 PLACE OF TERRITORY IN SUSTAINABILITY

Allais et al. encourages companies to integrate territorial resources into the product development process to create value for both the company and its territory in a sustainable perspective (Allais et al., 2015). Moreover, this research assists industrial companies to both explore the use of latent resources from their territory and to their responsibility facing their stakeholders in a sustainable perspective. Better circulation between the different organizational functions in company, improve the integration of

sustainable issues (Zhang et al., 2013) and studying a product’s environmental impact on an interacted territory’s environmental statues can increase decision maker’s information when considering design for sustainability (Vadoudi et al., 2017).

Thus, it is needed to organize the territorial knowledge for sustainability in the company. We proposed to represent this knowledge by using of ontologies. Ontology enables to meet the purpose of sharing knowledge relating to defined terms and concepts (Lin et al., 2013). In addition, previous works don’t consider which type of territorial knowledge affect on the industrial organization in a sustainable perspective and how they can affect.

The aim of this research is help to the industrial organization in order to increasing of their knowledge about their territorial resource to integrate this knowledge to their activities for sustainability and especially, the effect on the decision making of the industrial organization to create the value for human regard to existing territorial knowledge.

4 TERRITORIAL KNOWLEDGE ONTOLOGY

It is needed to define the notion of the intangible and tangible resource of territory as territorial knowledge. The territorial dimension should be taken into account, adapting global policy to local specificities to develop appropriate solution for the industry (Moine, 2006). We focus on ontology as suitable method for representation of dispersed knowledge of territory because ontology make domain assumptions explicit and analyze the domain knowledge (Wijesooriya et al., 2015). Territorial knowledge ontology is approach to manage knowledge and facilitate the consideration of the complex relation among different type of territorial knowledge to help industrial organizations in decision making toward sustainability.

In order to describing territorial knowledge ontology, it is need to justify the cluster of this knowledge. Human capital is valued as key value provider by integrating of individual, social and organizational capital (Gobert et al., 2016). Organizational capital within company ensure the efficient use of resources. Individual and social group identify the interaction with their environment within a geographical system (Barreteau et al., 2016). Human activities occur in the geographical system that is managed by stakeholders (Nitschelm

et al., 2016) and infrastructural capital in geographical system use for specific projects and facilities to improve the productivity (Gobert et al., 2016). The management of geographical capital is done by political entity (Barreteau et al., 2016). Moreover, economical capital creates the value for human and industry through the product for human consumption and provide resource for industrial activity (Nitschel et al., 2016).

Thus from this literature, four main clusters are identified for territorial knowledge ontology: human capital, geographical sphere, economic sphere, political sphere. Figure 1 represents the territorial knowledge, as tree flowchart, which consist 5 dimensions of sustainability.

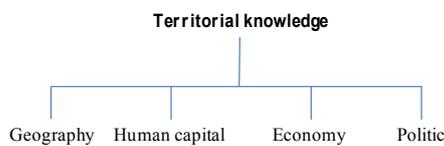


Figure 1: Tangible and intangible resource of territory, as territorial knowledge.

4.1 Relationship between Territorial Knowledge

There is the mutual relationship between categorization of territorial knowledge and their subset. Figure 2 show this mutual relationship as graph flowchart to demonstrate how four level of territorial knowledge are connected together for objective of sustainability.

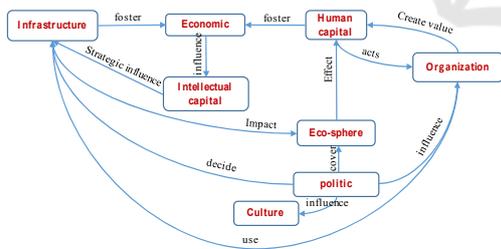


Figure 2: mutual relation between different categories of territorial knowledge.

5 IMPACT OF TERRITORIAL KNOWLEDGE ON THE INDUSTRIAL ORGANIZATION

Aim of this section is consideration the type of territorial knowledge and how this knowledge assist industrial organization in a sustainable perspective. Thus, at first, role and levels of industrial

organization in companies will be considered. Then, the effect of territorial knowledge and their subsets will be analyzed.

5.1 Industrial Organization

Industrial companies should have the knowledge about their territories features to embed this knowledge at all company’s hierarchical levels for sustainable objective, from global strategic decisions, tactical management, to daily engineering and production activities of the operational area (Hallstedt et al., 2010). Strategic level assists “top managers” who define the corporate strategic goals that will create multi-values for all stakeholders. At tactical level, a global approach is necessary to identify a sustainable trajectory depending on the strategic objective and the complex and dynamic changeable corporate context. The operational level supports deployment of the process in the company in accordance with the tactics chosen (Zhang et al., 2013).

5.2 Analysis of the Economic Capital Types to Help the Industrial Organization

Economic sphere is considered as a means which enable the realization of human objective to create the value. More over, market, client satisfaction and finance are the main territorial knowledge in this cluster which help the industrial organization (Gobert et al., 2016, Nitschelm et al., 2016, Allais et al., 2013). Value management support the integration of sustainable development. Value is defined as the relationship between the satisfaction of the need and the resources used to achieve this satisfaction (Habib et al., 2011).

The value is created for customers by use of an artefact and by optimizing production cost and strategic positioning in the value creation for company.

The market economy is based on the mass consumption. The value for the clients is created by the possession of an identifiable and rewarding object (brand, etc.). the value for the company is created by the reduction of production costs, the desirability of products.

The service economy aims to create value by adding service to products. value for the client is created by the multiplicity of service associated with an inexpensive good and for the company is created by maintenance of production cost at the lowest (Allais, 2015).

Table 1: economic elements link to the industrial organization.

Elements	How link to the industrial organization	Link to other territorial knowledge	Placed in which level of industrial organization
Market	Optimizing of cost for client and company	Industrial production system in infrastructural	Strategy
Service	Combination of service with low cost goods	Logistic in infrastructure	Strategy
Production system optimization	based on mass production	Manufacturer and artefact in infrastructure	Strategy
Functional	Satisfaction by pairing of product/ service	Environmental geography in Eco- sphere	Strategy
Quaternary	response by an array of products, service	Client satisfaction in economy	Strategy

The economy of functionality creates the value for client by the satisfaction of a level performance supported by product- service pair (Bourg et, 2005).

The quaternary economy aims to create value for the clients by customizing the response to his specific request. The company creates value by tailoring a panel of products and services that meet client expectations (Debonneuil, 2007). Also, Finance are not the source of wealth creation but its results and generate by operation and investments (Fustec et al., 2011). These evolutions in economic models have had profound consequences on the methods of value creation of the company and its organization.

Figure 3 shows detail of economic elements, as territorial knowledge ontology, to create value for human and companies.

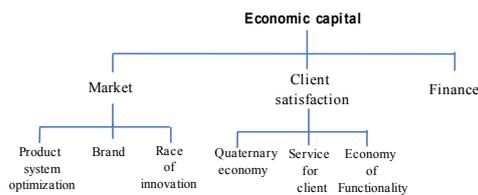


Figure 3: economic capital to create value for human and companies.

Table 1 show that how these economical elements link to the industrial organization and other territorial knowledge. More over, it is identified the placement of these elements within industrial organization.

Figure 4 show the relationship of economical elements together, also with other territorial knowledge in the other categories for value creation and sustainable objectives

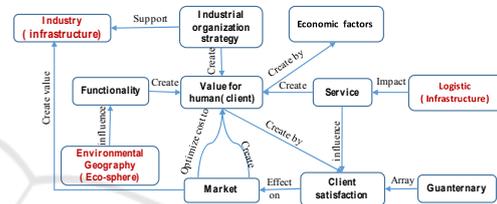


Figure 4: Graph of relationship between different elements of economy together and with territorial knowledge.

5.3 Analysis of the Political Capital Types to Help the Industrial Organization

The political sphere is the only legitimate arena to define development guidelines and must find a prominent place and take precedence over economic actors. Principle of governance such as capability, democracy, council and administration in different scales (local, regional, national and international) support the industrial organization, as territorial knowledge, for sustainability in figure 5 (Pecqueur, 2006, Buclet, 2011, Francesconi et al, 2015).

Democracy aims to build a balance between individual preferences and the common interest in meeting the challenge of sustainable development in company. Capability aims to develop the capacity of organizations/individuals to meet their own expectation and decision making level.

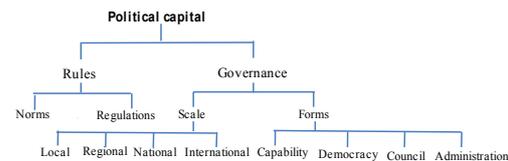


Figure 5: Political capitals to help to the corporate governance.

Allais et al. show the integration of intangible capital of territorial knowledge, such as human (stakeholders) and ecological aspects into strategic decision process of industrial organization at local scale. Strategic governance concerns decisions help to top managers and giving the value to the initiatives at the strategic level that come from operational level (Allais et al., 2017).

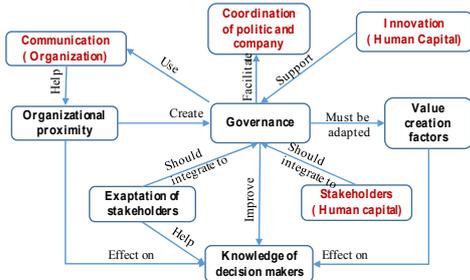


Figure 6: Graph of relationship between different elements of politic together and with territorial knowledge.

5.4 Analysis of the Human Capital Types to Help the Industrial Organization

Human capital is defined as ability to innovate, individual skills, creativity, experience, ability to work in team, motivation, learning ability and organization, etc. (Francesconi et al., 2015). These elements give a prominent place to the company’s organization with focus on the forward looking management of human capital (Allais, 2015). Individual, social and organization are the main territorial knowledge of human capital which help the industrial organization.

Intellectual capital (IC) as a cluster of Individual, is used to create and use knowledge to enhance the industrial value. This knowledge founded in the organization that add value to the products/ services through the application of intelligence (Jordao et al., 2017). IC links to the knowledge management in the organization of company though the knowledge, competencies to improve the organization process and ability to innovate. Increasing the body of knowledge relating to the links between value-creating processes inside the business (e.g. HR, logistics) help to the industry and increase the knowledge of decision makers (Allais et al., 2013). Also, Innovation as a skill of intellectual capital not sufficiently valued in the strategic level because don’t inform the strategic decision making that must be taken into account through knowledge management and governance in company (Allais et al., 2017, Jordao et al., 2017). Individual and groups

as a stakeholder can affect or affected by organization and it is need to them in different hierarchical level and their expectation should take into account in decision making (Zhang et al., 2013).

Identification of the organizational filed should be taken into account to create the commitment to the desired change for sustainability. Sharing of value for customers is created by the network that support the design activity (e.g. local sourcing, identity-related aspects of the product/service) (Allais et al., 2015). Creating of multi-value for stakeholders analyze by management of corporate human resource and knowledge to help to the strategic goals (Zhan et al., 2013). In addition, Exchange of information between actors of networks is necessary for communicating with internal and external actors to optimize the circulation of decision and data flow in the different level of industry. Industrial organization has emphasized that when decision making and information are not equally shared, different activities become unbalanced in company and stop allocating and distributing resources efficiently (Rio et al, 2013). Geographical information system(GIS) which can help product designers to analysis the environmental impacts before and after design, which change design characteristics and product specifications based on the environmental status of each geography (vadoudi et al., 2017). Moreover, co-ordination of actors improves territorial cohesion at different levels and support the different structure of territorial knowledge ontology (Toth et al, 2015). Details of human capital knowledge in territory can be seen in figure 7 as tree flowchart.

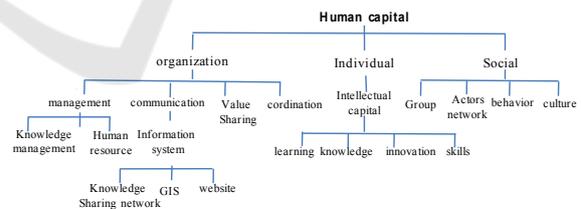


Figure 7: Human capitals, consists of social and individual elements.

Table 2 show that how the elements of human capitals link to the industrial organization, other territorial knowledge and help to level of industrial organization. Elements of human capital link together and effect on the other territorial knowledge which this relationship is showed in figure 8.

Table 2: Main human capital’s elements link to the industrial organization.

Elements	How link to the industrial organization	Link to other territorial knowledge	Placed in which level of industrial organization
Intellectual capital	knowledge & skills to add value to product/ service	Knowledge management, economic, environmental capital	Strategy, tactic , operation
innovation	Give the value by linking of operation and strategy	Governance and knowledge management	Strategy, operation
Culture and behavior	Cultural and behavior impact on decision making	Individual , group, and product innovation	Strategy, tactic , operation
Information exchange	Communication between actors of network to share decision , GIS	Environmental capital, governance, market, product	Strategy, tactic , operation
Coordination	Actors coordination, Structure’s support: market	Product, knowledge sharing in organization	Strategy, tactic

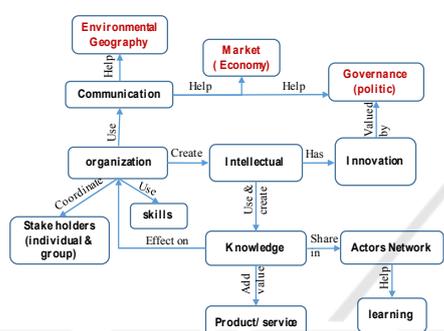


Figure 8: Graph of relationship between elements of human capital together and with territorial knowledge.

5.5 Analysis of the Geographical Capital Types to Help the Industrial Organization

Geographical system is considered as action perimeter and is the based system including physical features of the earth, atmosphere, resource, infrastructure and socio-ecological activities (Dahlman et al., 2015). It can be compartmentalized into geographical resource, industrial and anthropized ecosystem and human capital.

Eco-sphere refers to the human- environmental systems. Infrastructures act as fundamental facilities to improve the productivity of existing resources.

Environmental geography is the interaction of humanity and environment and define as space for the circulation flow (Cerceanu et al., 2018). Moreover, Industrial and territorial ecology is strategy of natural resource management and planning to create the economical, social and environmental value for stakeholders of a geography toward sustainability. So in this regard, coordination between actors can help to the implementation of

this synergy (Buclet, 2011). Natural resource as main element of a geography, is used to describe all of input flow from eco-sphere that enter to the techno-sphere (Zhang et al., 2015). Techno-sphere refers to global technology system integrating all human activities (Vadoudi et al., 2017).

Substance flow is a key factor to assess the resource consumption and environmental impacts. Moreover, substance flow can flow within the techno-sphere, and between techno-sphere and eco-sphere and their environmental impact should be taken into account by in three level of industrial organization through product life cycle in geographical system. Elementary flows, product flows and waste flows as sub parts of substance flows have the environmental impact within eco-sphere and techno- sphere (Zhang et al, 2015). Technology as one of sub classes of infrastructure that increase the productivity and great flexibility with supplier and customers that environmental impact of product can be abstracted as four types: production phase, transport phase, use phase and disposal phase by human or industry (Zhang et al, 2015). Sub classes of geographical capital is showed in figure 9 as tree flowchart.

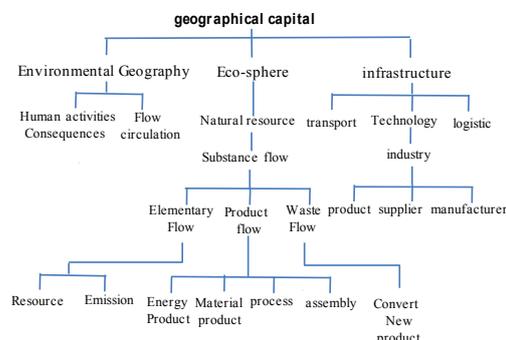


Figure 9: Classes of geographical capital as territorial knowledge.

Table 3: Main geographical capital’s elements link to the industrial organization.

Elements	How link to the industrial organization	Link to other territorial knowledge	Placed in which level of industrial organization
Substance flow	Environmental aspect by extracting of substance and produced substance	Human activity of social, transport, production in technosphere and eco-sphere	Strategy, tactic , operation
Resource flow	Input flow from natural resource that enter to industry	Supplier in geography, production in industry, GIS	Strategy
Product flow	Valuable substances produced from a process	Natural resource, technology, political capital	Strategy, tactic , operation
Human activates	Reduce the environmental impacts on ecosystems by Industrial ecology	Environmental capital, governance, economy, technology for producing from wastes, culture in, coordination of actors	Strategy, tactic , operation

It can be summarized from geographical capital that they are considered from environmental perspective and from this aspect can help to other territorial knowledge ontology for improving of sustainability in company. This consideration is showed in figure 10. Link between elements of geographical capital with industrial organization, other territorial knowledge is showed in table 3.

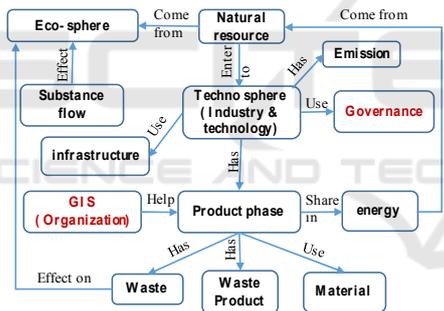


Figure 10: Graph of relationship between elements of human capital together and with territorial knowledge.

6 RELATED WORKS

Some of work define ontology for the sustainability according to territorial resources. Zhang et al. define ontology- semantic representation of product life cycle to organize the concept of process and flow of substance (Zhang et al., 2015). Cerceau et al., demonstrated the resource management by the territorial context through industrial ecology (Cerceau et al., 2018). Lin et al, illustrated an ontology based process-oriented to support the product development with knowledge sharing to help organizations, suppliers and customers (Lin et al., 2013). This ontology represents concepts related

to development stage of product and it missed the considering of human and geographical capital. Another research proposes sustainability knowledge improvement on multi-dimensional views to environmental management by focusing on sustainability (Wijesooriya et al., 2015).

It can be concluded that all of aspects of sustainability concepts represented in these works are difficult to be applied to help industries. Some of them only consider the environmental perspective and other consider economical with some aspects of social. In the research of Wijesooriya et al., individual, group and organization are used to reflect social ontological dependencies and there is not any consideration about political concept. Enhancing the knowledge of territorialization process in industrial ecology by identifying of local stakeholders is considered by Cerceau et al. In this ontology, the geographical capital is to be taken into account and there is missing about the social, political and economical concepts. A model proposed by Vadoudi et al. to integrate geographical data with product related throughout substance flows over whole life cycle (Vadoudi et al., 2017) and there is lack of human capital and economic and political concepts. In our territorial knowledge ontology for sustainability is tried to present a comprehensive taxonomy of territorial knowledge which can help industrial organization in order to value creation and decision making. It is introduced an intention of ontology that enables the description of successful sustainable dimensions and includes necessary relationships. Difference of our ontology is that this territorial knowledge ontology manages and facilitate the consideration of the complex relation among different type of territorial knowledge to help industrial organizations in decision making, value creation for human and company.

7 CONCLUSION

This Paper state the effect of territorial knowledge on the sustainability within companies. At first, it is founded that the lack of territorial knowledge and its feature are barrier for searching a possible concept for sustainability in companies. In order to answer this lack, it was needed to organize the territorial knowledge to help the hierarchical levels of industries, strategic, tactical and operational, toward sustainability. So, it is proposed an ontological based of territorial knowledge to support the industrial organization with identifying type of territorial knowledge. The aim was help to hierarchical level of industry for creating of value for human and industry and supporting the decision making according available territorial knowledge.

At present, this research is still a preliminary work. In future works, the most important elements of territorial taxonomy will be selected for considering the effect of elements on the sustainable perspective of industrial organization for goal of value creation. Moreover, it will be considered the influence of territorial knowledge on the actors of hierarchical level for sustainability.

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