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CHAPTER 9

Organization and Actors-Networks: An Action Research

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Abstract

In the series of testimonies articulating “management sciences” and “qualitative research”, this text addresses the use of the Actor-Network Theory for a knowledge creation on the waste crisis in Beirut since 2015 from the “model of intersement”. The three registers of ANT (as a theory, as a methodology and as a method) are put into perspective with a conclusion on the managerial contributions and the precautions to be taken in the articulation between a qualitative approach and the corpus of organizational theories. In addition to the interweaving between ANT and organizational learning (an important theoretical and empirical issue), the illustration developed in this text allows us to address, from a conceptual point of view, one of the major issues in the creation of knowledge in management sciences today: the question of sustainable development through the double register of waste and entrepreneurship.

Key words

Human actant, Non-human actant, Organizational learning, Intersement model, Actor Network Theory, Translation

Introduction

Like other social sciences, the management sciences appeared at the beginning of the 20th century, that is, at a time when the organization was becoming sufficiently important to raise the question of creating a specific field of knowledge. Like its “sister”, the accounting sciences, its field of knowledge is structured on the basis of a trilogy of “organizational theories - organizational questions (which is a translation - interpretation of the term *organizational behavior*, the notion of “question” seeming more appropriate to us, whereas the term “organizational behavior” in French reduces the field to a behaviorist foundation) - organizational techniques” (Martinet and Pesqueux, 2013).

It is this trilogy that underpins them, which means the existence of interconnectedness between the three registers (theories, questions, techniques) and which serves as the basis for most management science disciplines (marketing, strategy, human resource management, etc.) as well as for the recurring questions that tackle them (change, learning, innovation, etc.). It is for this reason that every management science curriculum contains a module devoted to organizational theories (de Rozario and Pesqueux, 2018).

This corpus is evolving, as the development of organizational theories is being done:

- By conceptual hypothesis that must then be empirically validated (a deductive reasoning that starts from a theoretical corpus then put to the test of facts - as with emotional intelligence that raises the question of its materialization in the concrete);
- By testing existing theories with regard to facts (an abductive reasoning which starts either from an existing theoretical corpus modified by its testing by facts, or the opposite, i.e. facts which make an existing theoretical corpus evolve - as with the reference to “transversalities” which questioned the separation of tasks);
- By conceptualization based on the observation of facts (inductive reasoning that starts from the facts in order to found a theoretical corpus - as with the Actor Network Theory (ANT), the theories of organizational learning or even local governance - which will be discussed in this text.

Organizational theories form a heritage that is built up through dialogue and controversy, and through the borrowing and quoting of authors from one another. This process can be considered as

the mode of institutionalization of theories carried by authors, i.e. the process that makes them references accepted by all.

It is also a question of circulation of ideas, which poses the problem of their contextualization in time (the relevance and recurrence of a theme carried by theories, as is the case for innovation with ANT), in space (American theories brought back to Europe and the rest of the world), and in terms of the socio-economic context (governance, whose categories will depend on the place and level that will serve as a reference).

As for other scientific fields, there is the problem of its boundaries with others. For example, if the object of study of anthropology is the group, management sciences borrow the method of ethnographic investigation, including its pedagogical form with the case study. Or if the question of learning raises the issue of how knowledge is acquired in the educational sciences, the management sciences borrow their incremental model by stages.

1- Social network of household waste circulation and organizational learning: the household waste crisis in Beirut since 2015

It is the purpose of this research, which will serve as an illustration of the use of a qualitative approach based on the actor-network theory, which we will see takes the place of theory, methodology and method at the same time.

1.1 Background

The growth in the volume of waste in general, and solid waste in particular, poses a major management problem in the world today. In 2018, according to a World Bank report, more than two billion tons of urban waste were generated, confirming a trend spotted over 30 years ago. Waste management is at the heart of sustainable development issues, as its treatment as well as its fate is a central questioning that the inhabitants of Beirut are facing since the closure of the main landfill in the summer of 2015, prompting the outbreak of the waste crisis. This landfill was hosting about 60% of the country's waste. The government was the only party responsible for waste management. Having failed to implement an alternative policy, the waste piled up on the streets for more than eight months, even a year, with no solution in sight. Some burned it in the open near homes and others dumped it in nearby valleys. Hundreds of illegal landfills have resulted in air, soil and groundwater pollution with serious environmental and health consequences.

By the end of 2015, new types of actors became involved in the implementation of waste management. Now, heterogeneous actors such as neighborhood residents, municipalities, activists, NGOs, experts, and recycling companies have become partners in a social network that has gradually been established, in terms of collection, sorting and recycling initiatives.

The particularity of this research lies in a reading of this situation taking into account:

- The emergence of waste collection, sorting and management networks;
- The involvement of several actors who, by interacting, form learning organizations around the management and recovery of household waste.

1.2 Research problematic and questions

The main objective is to understand the methods of waste management that have been put in place, with the intervention of a plurality of actors constituting a social network, actors who were not previously involved.

It is from this situation that the following research problematic arises: What is the learning that emerges from the social network of household waste recycling resulting from this waste crisis?

From this problematic, research questions arise which are the basis of the research approach, and structured after several back and forth between theory and field before stabilizing.

Three research questions stem from this problematic, each of them allowing to qualify an aspect of it. Then, a working hypothesis was formulated for each of the questions, taking into account the theoretical orientations on which they are based. These proposals contributed to the theoretical elaboration of the problematic and to the data collection.

Question 1: What do individuals who are involved in waste sorting learn?

Hypothesis 1: To modify their representations of waste

In a vulnerable environment such as Lebanon, it is therefore important to study the development of learning capacities in terms of knowledge of waste and its management. Therefore, it seemed appropriate to study the learning logic of what “constituted organization” in terms of organizational

learning models and to find the link between individual and organizational learning. Argyris and Schön (1996) consider learning as a process of trial and error, thus formulating an “adaptive theory” of learning at a level described as “primal” leading to new representations or “mental schemes”. Organizational learning acquires a collective dimension from a dynamic of interaction between individuals and a body of knowledge.

Organizational theories teach us that organizational learning is based on reference to learning stages, i.e. incremental learning by jumping through “loops” and “spirals”. In the end, organizational learning only occurs if individuals construct new knowledge that is then codified and incorporated into the organization’s theories of action, i.e., the knowledge shared by the members of the organization and transmitted through socialization processes. It is therefore necessary to know what learning we are talking about here, starting from the waste itself, because it is the waste that is at the center of these interactions.

When we speak of a network and of interaction/socialization between the different constituent parts of a network system, we must consider waste as being part of a common base for these parts. Starting from the model of the “knowledge conversion”, known as “SECI model” (Nonaka and Takeuchi, 1997), it becomes possible to see whether the tacit knowledge of each of them generates, through making explicit and socialization, a “deep learning” or whether it remains rather tacit.

Question 2: What learning?

Hypothesis 2: It is the waste as a common tacit that serves as the basis for a “knowledge spiral”

Individuals develop knowledge through observation and development of routines as well as other forms of knowledge that are not necessarily written down, but are present in the minds of members of different parties. According to Nonaka and Takeuchi (1997), tacit and explicit knowledge are essential and complementary in the creation of knowledge (cf. the “knowledge conversion” model). It is therefore necessary to examine whether the inhabitants will have learned something if this network organization for the collection, sorting and treatment of waste disappears.

It is also necessary to study the cooperative links that have emerged to describe the social relations that have developed. Did social learning allow, through the development of these interactions, the structuring of a network with a high social value?

This is in line with what Ostrom (1990) emphasized in her model of “common-pool resource” management, in which she stresses the importance of small-scale institutional arrangements that allow for better management among the various beneficiaries and greater sustainability of the resource. Governance in environmental management contexts, and here in the institutionalization of waste management as a common good, should generate the perennial substance of an organization, which is considered here from the perspective of the network actor approach. This approach makes it possible to take into account the heterogeneity of the actors and the importance to be given to the process of “translation” (a concept of ANT) which offers here, the constitutive elements of an organizational learning and a partnership governance.

This formalization allows us to see how waste articulates the different actors, some of whom were not involved before, but who have now become key actors in waste management.

This leads to **Question 3: What do we learn from waste?**

Hypothesis 3: It is the waste as a non-human actant that makes the learning organization

This is what justifies the reference to the actor-network approach - the ANT of Akrich, Callon and Latour (1988).

It is the waste, the non-human actant that connects human actants despite the controversies of which it is the object. By opting for the repertoire of “translation”, this research has developed on the observation of situations in which several actants interact around waste: Who translates what, to whom and how? Are waste sorting and collection organizations learning?

The demonstration was therefore built around the phases of the “interessement model” (a concept of ANT), to understand how the waste “creates organization” from the onset of the waste crisis.

These questions and working hypotheses do not constitute desired answers or specific expected results, but only a perspective for conducting the research in the field. The approach is intended to be comprehensive and takes the form of a **qualitative inductive approach of an**

exploratory type conducted in a logic of action research. It was necessary to manage the waste and the final situation had to be different from the initial one.

The material collected consisted of documents, field notes, a logbook and transcripts of interviews which were then put into perspective using analytical grids consistent with the categories of the “interessement model”. The different stages of this approach form the basis of the process of this action-research, taking into account the elements of articulation of the network of actants that is built and developed.

2- WHY DID WE MOBILIZE THE ACTOR-NETWORK THEORY?

2.1 The actor-network theory

2.1.1 ANT presentation

Actor-network theory (ANT), also known as the “sociology of translation”, was developed in the 1980s by Akrich, Callon and Latour within the framework of the *Centre de sociologie de l'innovation at Mines ParisTech*. It is now commonly used in management science.

Beyond humans, it takes into account objects (“non-humans”) and discourses, also considered as “actants”, according to a concept borrowed from Greimas (1967). Initially, Callon and Latour were interested in the conditions of production of science and, in particular, in the construction of scientific facts in the laboratory by questioning the distinction between “scientific fact” and “human fact”.

Their epistemological position is as follows:

- Rejection of externalist positions (the scientific fact is brought about by the pressure of the environment), rationalist positions (it is a questioning stemming from reason and therefore from formulated projects) and evolutionist positions (it is constructed, taking into account what exists, by accumulation or, more rarely, by rupture);
- Rejection of sociologization (the scientific fact understood as the result of power games and social factors);
- Distancing oneself from “deconstruction” and relativism linked to the “subject-object” relation (the scientific fact depends on the epistemological stance of the researcher).

They propose to think science in terms of a network that holds together humans and non-humans. These networks are constituted by relations that are built by “translation” through which the actants (individual or collective) pose as spokespersons and translate the will of collectives in order to enlist new actants. A scientific fact is the result of a series of translations (from instruments to the publication of scientific articles, taking into account grants and the way to obtain them, etc.) in a network where it takes on meaning and stabilizes itself. Knowledge circulates through successive “translations” whose certainty can be questioned by controversies. Action does not have a precise source and always involves a set of actants by mobilizing their energy.

ANT is at the same time a theory, a methodology and a method.

2.1.2 ANT as a theory

From a theoretical point of view, the richness of ANT is its transdisciplinary positioning insofar as its original focal point, innovation, is a concept that crosses at least the two disciplines of sociology and management sciences. Innovation is apprehended from its creation to its acceptance in a processual and interactive approach, where the heterogeneity of the actants is recognized, the diffusion of innovation not being considered as linear. It is the result of a collective activity conditioned by the success of the relationships between actants. ANT emphasizes the importance of the circulation of information, communication, adaptation and flexibility in the innovation process. Since innovation is collective, the decisions taken in an innovation process are multiple and heterogeneous. It is therefore difficult to know who is responsible for the diffusion of an innovation. Time appears to be of the essence here.

2.1.3 ANT as a methodology

ANT is also a methodological approach, having enriched the “actantial” scheme (Berthelot, 1990) which previously revolved around the notion of actor (cf. Crozier and Friedberg, 1977) with the tension between non-human actants (the waste, in our case) and human actants, i.e., the social groups that are articulated around it.

2.1.4. ANT as a method

Finally, it is a matter of method, since it proposes a way of interpreting the discourse collected by survey, whether it be answers to open questions or the collection of life stories. It is in this respect that the methods of interpretation that it proposes are in line with Greimas (1967).

The corresponding model is qualified as the “model of intersement” and is based on the following notions:

- The network, always heterogeneous, is defined as a “meta-organization” gathering humans and non-humans who act as mediators or intermediaries;
- Translation, which is a setting in relation that always implies a transformation (since it is a translation) and which consists in linking actants and issues that are *a priori* out of proportion. Translation makes the network intelligible and generally involves the analysis of controversies, which makes it possible to see how the actants translate their positions in the debates established around the facts and then lead the network to stabilize itself.
- The controversy that precedes the emergence of a scientific statement and an innovation. It is thus possible to link the actants according to the stages that enter the process that allows the network to be built and that stabilizes itself by an agreement resulting from the consensus on the facts;
- The between-definition is a form of dialectic amid the fact and the network that carries it and whose balance depends on the solidity of the consensus;
- The principle of symmetry (which is dual): on the one hand, the researcher must pay equal attention to subjects and objects (human and non-human actants) and, on the other hand, study the production process of the network through the controversies that animate it. This is why there can be no question of a clear-cut boundary between science and non-science, as the state of a controversy may be momentarily unfavorable to a fact that will later prove to be scientific.

Based on the concepts of the “intersement model”, they suggest a ten-step method:

- Analysis of the context: identification of the actants (human and non-human) involved, their interests, their stakes and their degree of convergence;

- The problematization of the translator, which consists in identifying, in a situation, what unites and what separates around a problem leading to the acceptance of cooperation, an act constituting a network. It is carried out by a translator accepted by the members of the network;
- The obligatory point of passage (geographical and institutional place) of convergence around an indisputable statement;
- The spokespersons who negotiate for each category of actant, which makes it possible to extend the network;
- The “investments of form” that result from the work of the translators allowing the emergence of intermediaries that better represent the actants and reduce the complexity of the negotiation;
- The intermediaries that represent what circulate between the actants;
- Enlistment and mobilization: enrolment consists of assigning a specific task to the members of the network, while mobilization characterizes their involvement in the action. It is the constitution of a division of tasks constituting the substance of the network;
- The extension and irreversibility: the extension of the network is the mark of its solidity by the multiplication of the number of actants around a core (mark of its irreversibility) by avoiding dispersion;
- Vigilance is characterized by the attention given to the actants;
- Transparency, in particular with regard to information on the actions of the actants and their communication, which is the necessary condition for the trust that allows the network to be;
- Punctualization, which is the composition effect resulting from the *mix* of actions carried out by the different actants, without which there is a breakdown of the network.

2.2. Using the ANT framework to understand the waste crisis

This research aims to understand how actors act and interact in the social network of waste circulation. It leads to the observation of intentions, discourses, actions and interactions. The material consists of documents, field notes and a logbook as well as interview transcripts.

The different stages of the “interessement model” serve as an interpretive context for the action research by highlighting the dynamics of formation and evolution of the network of actants. Dumez (2011) points out that ANT is a “technology of description”. The use of this approach indeed puts the question of description at the heart of scientific work. It starts from the fact that the actant is the one who modifies the course of things and that it is he who can change the intentions of others, while considering the objects (the waste and then the collection, sorting and recycling techniques here) as being non-human actants. They are the basis of the description of human interactions. The researcher is called upon to watch the actants; he observes them and watches them act and interact. Then come the controversies that the non-human actants generate and that lead to different points of view. It is therefore necessary to follow the actions and to note the transformations brought about by the controversies and their resolution.

Starting from a problem that affects the majority of individuals, heterogeneous actants agree to cooperate and discuss around a common project, which in this case is the collection, sorting and recycling of waste.

The originality of the actor-network theory lies in the fact that it places the action in the foreground before taking into account a more general context. Let us recall that our starting point is the end of waste collection in the summer of 2015. This situation challenged several collectives who found themselves in the middle of a chaos.

In this research, waste is at the center of all interaction. This is the first time in Lebanon that several entities have acted in response to an environmental crisis. Hence, the objective of the action-research is to accompany them by trying to understand the process of translation through the categories of the “interest model”. This process is composed of several relatively independent stages that evolve simultaneously, each marking an evolution in the negotiations through the mobilization of the actants.

Table 1 describes the system of associations between the different actants in a collection and sorting network, thus creating “sustainable” organizations.

Table 1. The main actors of the crisis, their problems and their goals

Entities	Municipality (local authority)	Residents and volunteers	Recycling factories and NGOs	Waste	Researchers
Problems / obstacles	Politization of waste leaves them without resources and without power	Their motivation on the short run	Profit on the short run without a sustainable solution	No sustainable solution, unknown fate	Lack of transparency and collaboration
Their goals	Empower and strengthen their legitimacy to govern by promoting the emergence of functional organizations of local concern	Sorting at the source and learning	Ensure recyclable material on the long run	Sorted, recycled and renewed	Learn in networks and increase knowledge

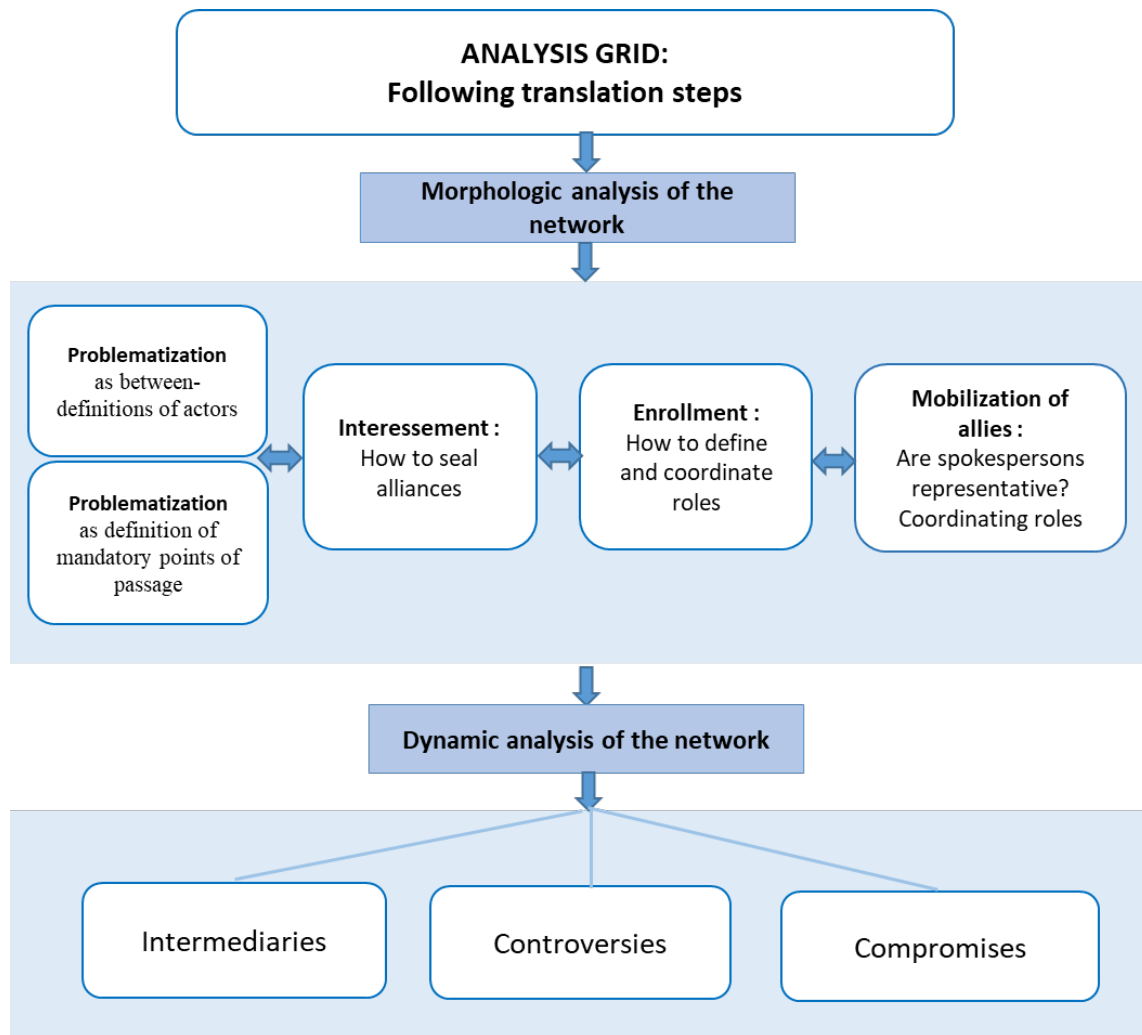
The different actants in this table have mobilized other human actors such as environmental activists and entrepreneurs who have developed their projects and continue to do so, to provide solutions to the waste crisis.

In this research-action, we must also note the importance of the experience of the researcher, who was originally a layman in terms of knowledge of waste and who, by observing and acting, became an actant-expert. This is a major experience that accompanies the transformative and learning phases in a network that has taken shape through controversies.

The data collection was based on the observation of two situations in two municipalities as well as on the professional experience of the observer within “Diane Foundation” in support of four start-up development initiatives in waste management. These initiatives, which began in 2015, developed from four types of household waste: that of an NGO collecting and recycling electronic waste, that of a social enterprise collecting and recycling used textiles and clothing, that of an initiative collecting and sorting organic waste, and that of an initiative raising awareness and collecting recyclable waste.

The analysis grid in Figure 1, taken from the “interessement model”, leads to the interpretation of each of the situations observed in accordance with its stages.

Figure 1: Analysis grid of the interessement model



The cases described are the result of participant observation and the researcher’s life story through the writing of an auto-ethnography constituting the action research.

3- Results obtained at the end of the research

This research aims to understand, through the “interessement model”, the mobilization of human actants from non-human actants, i.e. waste, in terms of its collection, sorting and recycling. We would like to recall that this is an action-research carried out in the field of sustainable development and based on an inductive approach by observing how waste is a generator of a learning organization in view of social, political and economic issues.

They were at the origin of an entrepreneurial dynamic. The 2015 crisis had a triggering effect: many initiatives emerged and organized themselves around the search for sustainable solutions.

Although they have the merit of working for their communities and for the environment, these entities still have, for the time being, a limited impact at the national level. They only deal with a fraction of the waste produced in Lebanon. The majority of it is still under the State's responsibility. However, year after year, we have seen an evolution in people's representations towards their waste due to the impact of social networks, collaboration between different entities and the success of the management model of several initiatives.

Waste cannot be outsourced and, therefore, cannot be forgotten; therefore, it is a source of interaction. This is a story that has been evolving since 2015. According to Argyris and Schön (1996), in a context of organizational learning, the researcher in an action-research program becomes an actor-experimenter which, by putting him/her in relation with the practitioners, also makes him/her one of them through his/her integration in the situations studied.

According to our observations, we noticed that the systematic repetition of sorting actions as well as the sensitization of the inhabitants through forums and local meetings led to the development of an environmental awareness, especially among those who were involved in this process. This allowed the transition to the second learning loop: the modification of people's representations through local initiatives involving several actants. Residents and local authorities were an obstacle to collective initiatives before 2015. Since then, they have joined forces with other entities, including those involved in raising awareness about waste reduction and sorting, those involved in launching sorting centers, as well as other associations and industries that join forces to share their expertise in the field. Thus, waste is now considered a common tacit that serves as the basis for the "knowledge conversion" model (Nonaka and Takeuchi, 1997). The shared experience in these different situations forms the basis for socialization among the actants.

Throughout the action, the tacit knowledge becomes explicit to the other group members in a social network of actants who discuss the waste that tells them something, which is then shared. This step leads to an innovative combination of explicit and tacit knowledge that is then internalized individually. The "knowledge spiral", as the name implies, is as endless as the learning. This approach is congruent with that of the actor-network because the waste, as a non-human actor, is the common tacit that makes people interact.

The sociotechnical assemblages observed in waste management are constantly evolving and also revolve around issues of innovation, valorization and circular economy, especially since the government has still not put in place a waste management plan or even defined a waste policy.

Inhabitants learn to valorize waste within a social network of collection, sorting and recycling. The more the network of actants grows, the more its socio-economic and environmental impact is evident. The related social entrepreneurship is growing and generating innovative activities.

The circular economy, a major innovation issue, aims to reduce the consumption of natural resources and above all to minimize the production of waste and to recover it. All these emerging organizations raise a lot of hope for the implementation of such an economy in a country like Lebanon, in terms of a third-loop organizational learning or “deutero-learning” (Argyris and Schön, 1996). This is also in line with the development of entrepreneurship, as it is a question of responding to a need for innovation, creativity and the ability to learn to learn.

4- Theoretical, methodological and managerial implications of the research

The field of research (waste management) is at the heart of current environmental issues. This creation of knowledge is therefore totally in line with the *Sustainable Development Goals* (SDGs) of the *2030 Agenda* as well as with the expectations of the *2015 Paris Agreement*. This is in particular directly the case of SDG n° 6 (clean water and sanitation) and indirectly the case of SDG n° 11 (sustainable cities and communities) and of SDG n° 12 (responsible production and consumption). The creation of knowledge is therefore coherent.

Its theoretical implications are the congruence of ANT with the two major models of organizational learning and, more secondarily, the conceptual framework of local governance. This perspective has simply been mentioned in the text and is a promising avenue of research. Another avenue of research opened up by the convening of ANT is that of understanding the substance of the innovation inherent in the social network of waste collection, sorting and recovery.

The mobilization of ANT has been on its three registers, i.e. that of a theory (by identifying and monitoring the articulation between human and non-human actants around waste), of a methodology (that of translation) and of a method (that relating to the “model of intersement”).

From a methodological point of view, ANT was called upon in the context of an exploratory type of action-research based on a qualitative approach that relied on data collection using documents, particularly, interviews and an auto-ethnography. It provided a framework for interpreting these data through the prism of the “profit-sharing model”.

From a managerial point of view, the proposed research offers a framework for understanding “green entrepreneurship” around “green innovations”, from the point of view of the entrepreneurs and companies involved, as well as from that of the funders (“Diane Foundation” in our context). It is likely to provide the information necessary for public authorities to define and implement a public policy focused on the development of an entrepreneurship focused on the challenges of sustainable development and even, more generally, to define an industrial policy.

The understanding of the articulation between the “Diane Foundation” and the concerned start-ups can serve as a basis of experience for a broadening of the financing towards other sources, whether private financiers or public financiers such as the World Bank, which is currently helping the Lebanese society.

This type of research can also feed the reflection on the *business model canvas* (Osterwalder and Pigneur, 2010), first of all upstream of the *canvas* with the formalization of an “effectuation” reasoning with regard to an “acceptable loss” (Sarasvathy, 2001) and an entrepreneurial pivot. The entrepreneurial pivot is, as we recall, the moment when, in the creation process, during the concretization stage, the entrepreneur modifies the product/service or changes the logic with regard to a newly identified opportunity within the framework of a “customer - problem – solution” loop, a loop that is in phase with the one discussed in the “interessement model”, which is paralleled by the organizational learning models.

The “intermediaries” of the “interessement model” thus make it possible to feed several key elements that make up the *canvas* (*key activities - key resources - key activities, - value proposition - key partners*). This is also the case with the “blocks” of the *canvas*: the customer’s knowledge (“the empathy card”, the formulation of which is consistent with the notion of “interest” in the ANT model), idea generation, prototyping (the “intermediaries” confronted with the possible options), *storytelling* (the story to be told to communicate - the *canvas pitch*), and the scenarios envisaged. Finally, this is the case for the dominant *business model* chosen to meet the challenges

of this type by braiding together a “sustainable development” orientation and a “technology – innovation” orientation.

Conclusion

The reference to ANT is nowadays common in management sciences and the former illustration has just shown what its use can bring to a questioning addressed to waste. Its mobilization implies a detailed knowledge of this corpus. In the same way that we have seen agencies everywhere, and then stakeholders, there can be no question of seeing human and non-human actants everywhere!

Even if the implementation of the “interessement model” resembles the “coding-interpretation” sequence of the “grounded theory” (Glaser and Strauss, 1967), the “argument-categorization” dyad is added here.

The use of a theoretical foundation requires a serious justification and one must be aware that any choice necessarily implies partiality, a partiality that must therefore be carefully justified.

Organizational theories constitute an essential field requiring a thorough knowledge of the occurrence of their appearance, of their place in the conceptual heritage that they constitute, of their central hypotheses, of the debates that concern them.

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