

Participatory approach in an International Technological Transfer Context. Venezuelan aluminum industry case study

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Abstract This paper explore the way in which workers in a Venezuelan's metallurgical company (aluminum smelter) participate in adoption of the technology necessary for the modification of the plant. This research integrates two perspectives: The context in which it is conducted, international technology transfer and the perspective of democratizing technology in a participative approach. A participative action research case of study was the methodology used to explore participatory technological adoption in an international technological transfer (from China to Venezuela). Preliminary findings showed a participative knowledge transfer in know-how relating to project management and the main problem detected by workers is referred to develop capabilities for intra-group training and diffusion of knowledge.

Keywords: Participation, international technology transfer, knowledge transfer

1.1 Introduction

The recently economic relation between China and Venezuela had allowed the outsourcing of some state metallurgical industries through a fund call "*Fondo Chino*". Workers in a Venezuelan aluminum smelter (*Alcasa*) have initiated a par-

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ticipative project management-driven in order to find a better way to adopt the technology involved. On the basis of meeting between university personal from Industrial Engineering and project managers in metallurgical industries where are contributing to developing a technology adoption in the scope of an International Technology Transfer to upgrade their production facilities to respond to market demand.

The purpose of this study is to explore the way in which technology adoption in a participative context occur. The research is on its initial phase joined to the project schedule for the modification of smelter plant.

First, we present an overview of the research perspectives: international technological transfer context and worker's participation approach. Then, we contemplate the methodology based on a participant observer qualitative strategy: a systematization case of study for technology adoption process in an equipment procurement from international sources through formal and informal workers participation. Finally, the preliminary findings are associated with internal knowledge transfer associated with project management in order to prepare workers for the international technology transfer.

1.2 Research Perspective

This research integrates two perspectives: The context in which this research is conducted, international technology transfer and the perspective of democratizing technology in a participative approach with workers control involved in decision making about technology and project design. Feenberg (2006) had called *operational autonomy* when the owner of the firm makes independent decisions about to carry on the business. In this context workers try to minimize this control with their participation in some management action like project management.

1.2.1 International Technology Transfer Context

There are studies that have been suggested differences between *technology transfer* and *knowledge transfer* (Gopalakrishnan and Santoro, 2004). The studies suggest that technology is usually more explicit and codified such as operating manuals and knowledge includes a broader scope considering scientific, mathematical, physical, and social/behavioral theories and principles. Knowledge is nearer to the know-how looked for in a technology transfer process. Results in this study have demonstrated that knowledge transfer and technology transfer are distinct constructs that involve different kinds of activities. In general, technology has been viewed in a technology transfer perspective by technology owner (the source, an industrial firm in a developed country) while technology buyer (the re-

ceiving developing country) is looking for know-how and need more knowledge transfer particularly in international technology transfer (ITT).

The unsatisfactory results of an international technology transfer project have been reported by Nahar, Al-Obaidi and Huda (2001) implemented from the perspective of the source of technology. But developing countries needs strategies in order to support new technology adoption. If the industrial firm which is the source of technology will assume the international technology transfer as a compromise with the recipient, then technology transfer could occur through a knowledge manager strategy. They have studied ITT from this point of view and refer to the complexity of technology transfer process when the project is implemented in a developing country or a emerging economy dealing with the knowledge capabilities and involving many tacit knowledge. In this case, the result is not a necessary and effective technology transfer, the study have referred.

Mostert and Buys (2008) have analysed the importance of seven statements associated with an efficient technology transfer process. Those are: the purpose of technology transfer, specialists involved, environment in which technology transfer happens, timing of technology transfer referred to when the adopter can prove that he can reliably produce the technology in his environment, technology as a product related to a vision of the requirements of the client, justification of the investment in the transfer of the technology to satisfy the user's requirement and the transfer process. This justified that workers and personnel involved have to prepare them in order to technology adoption.

Nonaka and von Krogh (2009) have made conceptual distinction between tacit and explicit knowledge and their conversion mechanism. Tacit knowledge in an international technology transfer process requires its capture in order to manage that new technology. If receiving country do not have information technologies tools support, the transfer technology process occurs in an environment where people is the core of that process and knowledge in the firm mainly depends on that interchange (tacit to tacit). In order to assure a satisfactory international technology transfer results the technology receiving company has to develop strategies to share knowledge in that context.

The trade between China and Venezuela is growing since the last ten years where China government is supporting the recently Venezuelan industrial growing in agricultural areas, automotive and telecommunications. This co-operation is supported through a both countries financial fund called *fondo chino* where the source of technology is decided between both Venezuelan an Chinese technicians and technology comes from Italy, German or China creating a complex environment for project management.

1.2.2 Participative Approach and Technology

The participative approach in this research is associated to *industrial democracy* (Bonavía and Quintanilla 1999), (Summers 2000) where workers look for a major participation in labor planning and decision making. A previous research (Cova, 2011), points out the goal of industrial democracy related to “introduce democracy into the government of industry” (Summers 2000) with main principles:

- It comes from below. Workers promote participation increasing their control
- Collective agreement established rules instead imposing them from above
- Participation is structural and promote organizational changes

As Feenberg (2002) (2006) said “socialization, democratization and innovation” could minimize “*operational autonomy*” from managers allowing workers more freedom to involve in planning design and technology. This is the case when a new technology or a modification is needed at the firm.

In workers council perspective, workers demand participation in all management areas of the organization, mainly control of production decisions which are related to technology. In Venezuela this participation form is called *control obrero* (Cova 2011) associated with political changes. Workers demand more freedom and control of their knowledge and want to increase them in order to reinforce their control of the firm and decide about managing technology and innovation (Rojas 1999) and accumulate freedom in the firm.

Cova (2011) find out that workers recognize that bureaucracy in the organization push them to work in operational area only and not in other activities traditionally reserved to managers who keep on productivity and rentability as main purposes, not socialization and innovation (Feenberg 2002) in the sense of looking for a new way of labor organization benefiting the whole society. Workers council encourage to them in order to look for a broader scope of participation like decision in technology acquisition, project management, design and innovation.

A Peruvian study explored knowledge building through a more participatory, collaborative approach during a project development (Alvarez and Vodden, 2008). Their model is based on participatory action research, knowledge management, and sustainable community.

1.3 Methodology

This study related to participation and technology is involve in a tacit knowledge environment and required a methodology that take advantage of this situation. Because of that, a participatory action research strategy was selected. Some studies have reported its use for doing research with people and conducting knowledge management research (Breu and Hemingway 2005).

A participant observer strategy was used to document the research project through a systematization of experience. The study is focused on a Venezuelan metallurgical company which is aluminum smelter in an international technology transfer process under Venezuelan – China trade relations.

1.3.1 Project Workgroups

Workers promoted four workgroups to follow the projects with the assistance of a project's technician department and other support department like industrial engineering as workers needs emerge.

The groups were mainly formed with production and maintenance workers who come from the old areas which are going to be under modification: reduction, smelter and rolling or a new extrusion area to be created. Each group is formed by around 8 to 10 people.

The participation of researchers is associated with learning workers needs in order to develop knowledge transfer strategies through the whole project.

1.3.2 Systematization of a Participative Experience

In this study we followed the systematization of participative experiences general steps as a way for organizing and emerging knowledge: organize systematization team from participants who live the experience, select systematization route, reconstruct the history of the experience, reflection, interpretation and communication the new knowledge (Mejía 2008).

Two strategies were conducted for this research: participant observer and focal groups. Through participant observer strategies the researchers assist the project workgroups meeting in order to hear their needs and problems those were discussed in a posterior training- research focal groups.

Focal groups were conducted with generating questions that allows workers talking about:

- How participation encourage their knowledge in the China-Venezuela technology transfer project?
- Which problems and needs come from the technology transfer project associated with their participation?

Then, the systematization axe was defined as workers empowerment through a participatory strategy in technological adoption.

1.4 Preliminary findings: Participative Technology Transfer

This study results are related with the initial phase of the technology transfer process. In this aluminum smelter old firm, previous experience in managing a project were conducted only by personnel who came from the project management department without general workers participation.

Workers participation in technological projects started in the middle of year 2009 when government accepted to promote the initiative for workers empowerment creating a plan called *Plan Guayana Socialista (PGS)* through the participative *control obrero* strategy at those metallurgical installations located at the south of Venezuela on the right margin of the Orinoco river.

The key finding about the participative technology focus on workers knowledge acquisition and their problems and needs related to the participation strategy.

1.4.1 Participative knowledge transfer

The process started in the year 2009 when a first group of workers organized *mesas de trabajo* in order to define technological requirement for a new extrusion installation which will allow the firm processing more elaborated products. Then, in the year 2010 other three groups were organized in order to select the equipment necessary for the modification of several installations in this old factory corresponding to reduction, smelter and rolling areas. In both cases, with the first and others groups, an intra organizational knowledge transfer occurs because of the workers unexperience in project management. Focal groups workers reflection about their participation in project management showed that an intra knowledge transfer have allowed them the following consensus:

- “know-how to manage some activities in a project”
- “Understand the need of documenting the project”
- “Learn how to read drawings and technical specifications”
- “Recognize the importance of the projects for the whole factory improvement”
- “Developed low cost changes in equipment in order to save money for the new investment”
- “Prepare preliminary inputs for design process and their interaction with China technicians”

In other way workers consider that their participation in project management encourage them to develop capabilities through self-training in different matters they do not know before.

1.4.2 Problems and Needs

The main problem detected by workers is related with training and diffusion of knowledge intra groups. Because of that, they ask to the researchers for orientation and guide session about how to share the technical knowledge they have learnt. Other needs were associated with the preparation of their meeting between China technicians and them related with the a delegation to the *Alcasa* smelter for the first design liaison meeting for the purpose of collecting the information required for the engineering and finalizing the technical specification.

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