

Qualitative Data Collection and Analysis: Some Methodological Reflections

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Quantitative and qualitative research in the social sciences are often compared and sometimes opposed in terms of their epistemological stance to the generation of theories and generalization of the findings. In contrast to quantitative research using surveys and statistics that are depicted as hypothetic-deductive, most qualitative research involves inductive reasoning. The collection of data through observations and interviews implies a generalization of the results from the comparison of individual cases or units of analysis. However, both approaches are overshadowed by the selection of previous theories, their relevance to the topics and research agenda, the analysis of data, and the generalization of the findings. In the social sciences, there is a vast literature that covers those issues. Among the main methodological discussions, the confrontation between the literature and the empirical data is the topic this paper discusses. When and how to use and integrate the literature in qualitative research? How to compare different sets of data with each other and with previous theories? How to generalize the findings? Those three questions invite the social scientist to adopt a reflexive stance on the relation with his/her topic. They also open several methodological questions related to the dynamics of a research project.

This paper reflects on these methodological issues by presenting and discussing the author's doctoral research from 2006 to 2011 in which inter-firm relations in France/Germany and Japan were compared (Heim, 2011), and performs a reassessment roughly twelve years later. It reexamines the collection and analysis of data (56 interviews with firm representatives, and 50 observations of factories and their labor processes in the automobile sector) and the integration of previous theories into the research protocol. It also explores how some methodological tools and guidelines developed by grounded theorists would have changed the research dynamic had they

been adopted. The rest of the paper is organized as follows. In the first section, some aspects of grounded theory (hereinafter GT) are identified and investigated in regard to their applicability and relevance to qualitative data analysis. The second section turns to my research protocol used during my doctoral research, and its comparison with *ex-post* GT analysis to assess the contribution of this methodological tool to qualitative data analysis.

Qualitative research and grounded theory: the central role of empirical data

Grounded theory was first introduced by Barney G. Glaser and Anselm L. Strauss in 1967 in their seminal book *The Discovery of Grounded Theory*. The book presents the main tools of GT, namely coding, constant comparison, theoretical sampling, and theoretical saturation. Their aim is to encourage scholars not to rely on previous theories garnered from a review of the literature, considering that such an approach can hinder the discovery of theories from the collection and analysis of empirical data. They favor approaches that give primacy to the analysis of data as soon as the data are collected. This entails a dynamic process that stimulates the “sociological imagination” of the researcher, over heavy dependency on previous theories. However, since the introduction of this methodology, the views of the two authors and their followers have diverged in relation to the elaboration of such research protocols.

When and how to use and integrate the literature review: the dividing line

Most of methodologies stress that a literature review should be done before engaging with data collection to delimit the perimeter of study, and to define its perspective and focus. When it comes to the question of the integration of the previous literature or theories, the GT stance is at odds with most of its critics. In its extreme assertion, GT invites social scientists not to start with an extensive review of previous scientific concepts and theories. It is argued that it hinders or blocks the stimulation and discovery of theories from the empirical data. It can also mislead the research by confining the research to certain aspects. Glaser stressed that “grounded theory’s very strong dicta are a) do not carry out a literature review in the substantive area and related areas where the research is to be conducted, and b) when the grounded theory

approach is nearly completed during the sorting and writing up, then the literature search in the substantive area can be accomplished and woven into the theory as more data for constant comparison" (1998: 67). This statement is founded on the belief that a detailed literature review in the specific field of research (substantive area or theory) may misdirect data collection, mislead analysis, and obstruct the development of theories by imposing on the data specific theories and hypotheses. An early review of literature would also constrain the researcher from developing and nurturing his/her own ideas. Finally, some existing theories regarded as authoritative in a field of research could also inhibit the researcher's own ability to question the data.

Glaser (1992, 1998) and Glaser and Holton (2004) proposed an "orthodox" approach in reaction to Strauss (1987), and Strauss and Corbin's more flexible methodology (1990, 1998). "To remain truly open to the emergence of theory is among the most challenging issues confronting those new to grounded theory. As a generative and emergent methodology, grounded theory requires the researcher to enter the research field with no preconceived problem statement, interview protocols, or extensive literature review. (...) Remaining open to discovering what is really going on in the field of inquiry is often blocked, however, by what Glaser (1998) refers to as the forcing of pre-conceived notions resident within the researcher's worldview, an initial professional problem or an extant theory and framework" (Holton, 2007: 269). This radical view is a critique of the exhaustive review of substantive literature and preconceived theoretical frameworks such as the conditional matrix proposed by Strauss and Corbin (1998). This position raises several questions on when and how use a literature review.

What kind of literature should be accessed at what stage of the research? If the literature review is performed before data collection to serve as a theoretical guide to the researcher throughout his/her fieldwork, it is asserted that it can become a barrier to the understanding of the collected data. It also has a strong propensity to steer the researcher towards certain hypotheses, while leaving others aside. If the literature is substantive, meaning in the field of research, the researcher gains knowledge, but it is necessary to pay a great deal of attention and adopt a critical stance to the methodological and analytical frameworks elaborated. While the collection and analysis of data are underway, new ideas that emerge from the field might lead to the researcher exploring other "peripheral literature" (those with no direct connection with

the substantive field) to test their emerging hypotheses and become engaged in new possible explanatory routes. For instance, Dunne who adopted the position of engaging extensively in literature review before the collection of data, was also cautious of his own preconceived ideas, and the necessity to be critical of the literature. “One mechanism to counteract the possible negative impact of early engagement with existing literature on the grounded theory research process is the idea of reflexivity, defined by Robson (2002, p.22; quoted in McGhee et al., 2007, p.335) as ‘an awareness of the ways in which the researcher as an individual with a particular social identity and background has an impact on the research process’. This is of course not a new concept, particularly for qualitative researchers, and is based on the thesis that because the researcher influences both the gathering and interpretation of data, primary or secondary, the need for reflexivity forms a crucial part of the research process (Heath, 2006)” (Dunne, 2011: 118).

How to generate theories from data: systematic an iterative comparison of coding

The second concern of GT revolves around the commonly adopted dynamic of qualitative research – theories > logical deductions > hypothesis > measurements and observations > statistical or verbal summarization leading to empirical generalizations, creative leaps or theories (Wallace, 1971) – and its shortcomings. “The grounded theory researcher should not expect to proceed in a linear fashion from raw data to concept cards to preliminary writing on theory to the final theory” (Martin and Turner, 1986: 150). This statement summarizes the essence of the dynamic process that involves qualitative data treatment in GT, the pairing and articulation of data collection and analysis, processed together. It is often undermined by researchers and leads to the difficulty to generalize the findings and to discuss their theoretical implications. GT proposes a specific methodology whose framework is the generation of coding, categories and theories from the constant and systematic comparison of collected data.

Coding is the elementary skill and task of the social scientist and entails the reflexive action of data processing. It begins during the first collection and scripts of data and is an evolutionary and dynamic process encompassing the constant interplay between data collection and its coding. The codes do not derive from existing theories or concepts, on the contrary, they are the result of the confrontation between the data

and their meaningful interpretation. “By coding, researchers scrutinize and interact with the data as well as ask analytical questions of the data. They create their codes by defining what the data are about” (Thornberg and Charmaz, 2014: 156). They correspond neither to preassigned categories, nor the operation of comparing the data after their final collection. The interplay between the data and its coding is already an analytical task. Even though in GT the question of the types of coding, their degree of “openness” and the reference to the social constructs of the behaviors are debatable matters, the different forms of coding and their degree of “analytical elaborateness” should form a consensus. Here I refer to two types of coding, initial or open coding, and focused or selective coding.

“During initial coding we study fragments of data – words, lines, segments, and incidents – closely for their analytical import. From time to time, we may adopt our participants’ telling terms as codes. Initial coding continues the interaction that you shared with your participants while collecting data but brings you into an interactive analytic space” (Charmaz, 2014: 109). At this stage, the codes emerge from comparing data with data, and the researcher asks analytical questions that cover the nature, the category, and the relevance of the data. It also implies an effort to construct simple and intelligible codes that are relevant to the observed behaviors and “incidents”, and the causations. The initial coding is not a rephrasing of interview data. It also involves constant comparison of data with data, data with code, and code with code so that a clustering of initial codes emerges. Focused coding is not a second step but a parallel treatment that consists of selecting the most relevant initial codes, those that appear frequently and cover convergent behaviors or actions isolated from the treatment of the interviews or observations. It is a process of comparing initial codes with each other. The systematic comparison of initial codes, even though they might be revisited in terms of relevance and/or naming, helps similarities to emerge from a large amount of data.

The comparisons are more detailed and complex than simply comparing different variables, data or codes with each other. Thornberg and Charmaz (2014: 159) list the following array of comparisons: “(1) comparing and grouping codes, and comparing codes with emerging categories; (2) comparing different incidents (e.g. social situations, actions, social processes, or interaction patterns); (3) comparing data from the same or

similar phenomenon, action or process in different situations and contexts (...); (4) comparing different people (their beliefs, situations, actions, accounts or experiences); (5) comparing data from the same individuals at different points in time; (6) comparing specific data with the criteria for the category; and (7) comparing categories in the analysis with other categories". Commonly, analytical treatment in qualitative research fosters the comparison of sets of "raw data" with each other. In GT, comparison is more elaborate than a unit-to-unit comparison or comparison based on dependent variables (e.g. gender, profession, income, educational level, generation, social class). The explanation does not only lie in some social situations or positions, but in a more refined account of behavior.

Finally, another aspect of the research methodology that warrants discussion is when can the collection of data be considered to be over? Contrary to the general assumption that puts the emphasis on the number of cases covered (the larger the number of cases studied the greater the chance of having a sound dataset), GT invites the researchers to pay closer attention to the nature of the collected data and the codes and categories. The majority of grounded theorists refer to theoretical saturation as the marker for the end of the analysis. "(...) The constant comparison of interchangeable indicators in the data yields the properties and dimensions of each category, or concept. This process of constant comparison continues until no new properties or dimensions are emerging. At this point, a concept has been theoretically saturated" (Holton, 2007: 281).

To summarize, GT offers a methodology of qualitative data analysis that gives primacy to the data over the theory during the analytical process and the coupling of data collection and analysis. The provocative statement that no literature review should be performed before data collection can be considered more as a methodological caution than an imperative. Indeed, one can consider that this helps to distance oneself from the existing literature in order to not overly constrain the research protocol, the interview guide, the research hypotheses, and the researcher's self-positioning in the scientific field. Though several working hypotheses accompany the research through the stages of data collection and analysis, those causal relations (theoretical sampling, or systematic comparison between different codes that emerged from the data analysis) work more like analytical hypotheses that also integrate previous theories. The

confrontation between the hypotheses that emerged from the comparison of the codes and previous theories, hypotheses and concepts is seen as the best use of the literature review. The discussion is an epistemological one, since it deals with deduction, induction and abduction. Scientific discoveries are often considered to follow either a hypothetical-deductive approach or an inductive one. However, grounded theorists tend to give primacy to the abduction approach, in a manner similar to that of Bulmer. “For theories are not developed deductively or inductively, but *both* deductively and inductively. There is constant interplay between the observation of realities and the formation of concepts, between research and theorizing, between perception and explanation. The genesis of any theory is best described as a reciprocal development of observational sophistication and theoretical precision’ (Lachenmeyer [1971] p. 61)” (Bulmer, 1984: 248).

Revisiting qualitative research with guidelines from grounded theory

This section is an account of my doctoral research mostly based on the narratives of suppliers’ trajectories working for Toyota. I first show how the literature review on substantive theories before the data collection and analysis framed the research dynamic, its evolution by the incorporation of new theories at different stages of data collection and analysis, and the limits of this first analytical framework. Then, roughly twelve years after the research, I point out how the implementation of some guidelines from GT could have changed the research with a greater focus on a systematic comparison of data and some coding.

The literature review to define the analytical framework: some precautions

In the late 1980s and 1990s a large corpus of literature emerged that aimed at explaining the specificities of Japanese firms compared to Western ones, in the context of the growth of Japanese automobile and electronics makers in North America and Western Europe. I reviewed this literature extensively before collecting data. Among others, case studies from transaction cost economics (Williamson, 1979) inspired my first research protocol. Following this literature, several modes of transactions between manufacturers and suppliers were characterized, depending on “(1) the frequency with

which they recur, (2) the degree and type of uncertainty to which they are subject, and (3) the condition of asset specificity” (Williamson, 1993: 93-4). In the literature, the long and exclusive relations between a car manufacturer and a group of suppliers in Japan explains the emergence of relation-specific skills, cooperative behaviors, and incentives to keep costs low and maintain high-quality standards. The analytical framework developed by Asanuma (1989) shaped my own representations of inter-firm relations in the Japanese automotive industry and was a guide to the first investigations I undertook. He distinguished three types of transactions based on the forms of subcontracting – marketed goods-type parts, drawings supplied parts (the drawings are provided by the client firm and the suppliers produce the parts following these strict requirements), and drawings approved parts (where the suppliers are also in charge of designing the drawings, they have higher development capabilities and authority) – and compared the relative amount of investment in relation-specific skills distinguishing four categories of skills (cf. table 1).

Table 1. Relation-specific skill, Asanuma, 1989

CONTENTS OF RELATION-SPECIFIC SKILL BY MAJOR CATEGORIES OF PARTS

Major categories of parts	Major components of relation-specific skill			
	X ₁	X ₂	X ₃	X ₄
	Capabilities that become visible through interactions held during the early development stage	Capabilities that become visible through interactions held during the late development stage	Capabilities that become visible at deliveries during the production stage	Capabilities that become visible at price renegotiations during the production stage
Marketed goods-type parts	(Low visibility to the core firm)	(Low visibility to the core firm)	1. Ability to assure quality 2. Ability to assure timely delivery	(Low visibility to the core firm)
DA parts	1. Ability to develop the product in response to the specifications from the core firm 2. Ability to make proposals on specification improvements	1. Ability to develop the process based on the drawings approved (visibility ranges from high to low) 2. Ability to reduce prospective costs through VE	1. Ability to assure quality 2. Ability to assure timely delivery	1. Ability to reduce costs through process improvements (visibility ranges from high to low) 2. Ability to reduce costs through VA
DS parts	(Not relevant)	1. Ability to develop the process based on the drawings supplied 2. Ability to reduce prospective costs through VE (through proposals on design)	1. Ability to assure quality 2. Ability to assure timely delivery	1. Ability to reduce costs through process improvements 2. Ability to reduce costs through VA (through proposals on design improvements)

Source: Asanuma, 1989: 24

My first factory observations and interviews with company representatives referred explicitly to this analytical framework and were directed to the analysis of the length of the transactions, the forms of subcontracting with the client firms, the specific skills deployed by the suppliers and the share/flow of technical know-how. However, after a few observations, I noticed that those analytical codes acted like a barrier to the understanding of the socio-technical environment that is more complex than in this representation of transactions. It was difficult to explore the resources available to the companies, the use they made of them, and the way in which they acquired and articulated these resources outside the exclusive manufacturer-supplier relation. An exploratory interview and case study of product development was especially illuminating. Two approved drawings suppliers that delivered a similar part to Toyota, one for Japan and the other for Europe, were tied very differently to Toyota (relation-specific skills). Indeed, in the product development phase, the tests of the parts to Europe were not implemented by Toyota's engineers, but by those of the Japanese supplier in charge of the same product. This made clear that restricting the analysis to the manufacturer-supplier relations is too narrow to grasp the complexity of the transactions. They involve many other actors, resources, and procedures. I therefore turned to another stream of literature capturing "technical solidarities" and "technical ensembles" to shift away from the sole manufacturer-supplier relations.

I have broken down the socio-technical dimension into two fields: the technical devices themselves and the way they are deployed within the company and articulated with those from other companies to make them compatible, referring to Nicolas Dodier's work and observations made at a metal drum manufacturing factory (Dodier, 1995). I asked questions about both the functions of these devices, and the methods of acquisition and the linking of these technical objects with their intrinsic know-how. I did not impose a dichotomy between technical ensembles with their own rationales and human actions that are supposed to be subject to and determined by technical logics. On the contrary, the aim was to grasp the continuum in the activity of machines and human activity and the type of relationships created by technical mediations. "This example shows how chains of solidarity are established along technical objects which, when linked together, form what Simondon (1958) calls 'technical ensembles'. These links are defined from close to close, because around each technical object stands out,

against the background of the environment, what Simondon calls the associated milieu i.e., the set of beings with which exchanges take place" (Dodier, 1995: 13, author's translation). Technical solidarity, "the form of links between beings created by the functioning of technical ensembles" (Dodier, 1995: 14) was adopted as a code of interrelations between technical ensembles and associated environments.

To understand these solidarities among firms that are both manufacturers, suppliers, client and rival firms, I first examined the structure and role of each socio-technical ensemble, and then re-explored the transaction patterns, and more importantly, the adjustments made to accommodate each other's activities. The technical ensemble is the result of these adjustments between machines, tools and materials. The activities consisting of the coherence of these dimensions, with regard to the operating devices imposed by the client firm, create the socio-technical whole. Exploring the socio-technical sets with the interlocutors corresponds to understanding the technical functioning, the human activity that consists of their implementation, and decisively, the bargaining power of suppliers.

Moreover, after a few observations, I also noticed that my comparison was limited to data from different firms considering one main variable, its position, rank or tier in the supply chain, which is a common representation shared by the actors and the literature. I assumed like other researchers that the closer the suppliers to Toyota, the more relation-specific skills the suppliers have acquired. However, this did not fit with some of my observations, especially with the general assumption in the literature that such relations entail exclusive relations with one main client firm, that the transfer of knowledge occurs on a top-down basis, and that the transaction patterns are stable over time. The observations showed on the contrary that the largest and closest firms to Toyota, meaning those that are part of its business group (*keiretsu*), also contracted with other car makers and were able to somewhat dictate the prices, technical, quality and delivery conditions and requirements to Toyota. When observing smaller firms at lower ranks (not directly delivering to Toyota and not members of its *keiretsu* or its main suppliers association, *kyohokai*), new and surprising data emerged. Most of them were truly dependent on and had long-term relations with Toyota (directly or indirectly), and were often in competition with each other for the delivery of a similar product in a way that forced them to cooperate informally with each other.

Throughout my collection of data, I had to reconsider the initial analytical framework designed based on the literature review of substantive theory, and further include other “peripheral works” that might complement and augment my understanding. However, the previous exhaustive literature review helped me to question my observations with the “analytical framework” I referred to. In turn, it also was beneficial to delimiting the “perimeter of my research”. Later in the analysis, readings turned to more general theories on productive models (Boyer and Freyssenet, 2002), the sociopolitical construction of markets (Fligstein, 2001), and the varieties of capitalism (Hall and Soskice, 2001) for example.

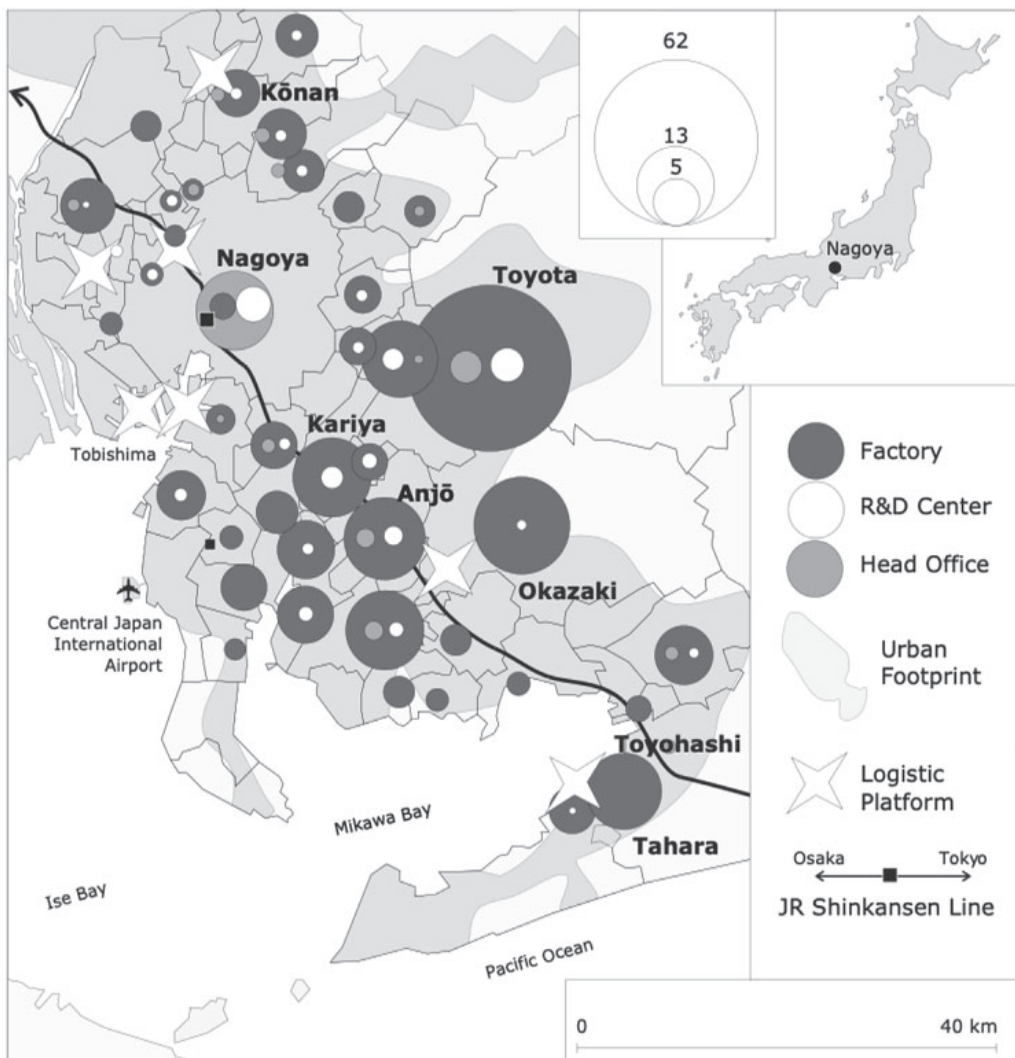
The literature review is often depicted as a way to acquire knowledge on the topic and to delimit the research perspective and focus. In this example, I started with a body of literature that mostly confined the research perspective to the manufacturer-supplier relations in Japan, and the research focus on dimensions such as loyalty, trust, and relation-specific skills. However, contrary to the assertion of the orthodox GT that no previous literature should interfere with or “infect” the collection and analysis of empirical data, in my experience it is still necessary to explore substantive theories before the collection of data with a constant posture of reflexivity. Previous theories offer a range of explanations that can be confirmed or infirmed by the collection of data. In this research, the case study was similar to most of the previous studies (transaction relations in the Toyota Group), but during the fieldwork, I understood that the perimeter of the case study (Yin, 2009) and the way the transaction patterns were depicted needed to be reassessed. As for the transaction patterns, the most salient part of the research, the recoding, was a time-consuming, ever-evolving, and dynamic process as described below. Diverse readings at different stages of the collection of data were necessary to refine the analysis. One must also consider whether these theories are substantive (restricted to the field of research) or formal (high degree of applicability to other fields).

Emergence of new codes: what should be learned from grounded theory?

The fieldwork on inter-firm relations in the automotive industry consisted of 96 interviews of company representatives, workers, trade unionists, state representatives, and social scientists conducted between June 2006 and May 2011. It concentrated on

two large automotive manufacturing clusters, the Alsace Franche-Comté region in France and the neighboring German region, Baden-Württemberg, comprising 15 car and engine assembly plants (PSA Peugeot-Citroën, Daimler, Volkswagen, Ford, General Motors and Renault) for a yearly production of roughly 2.1 million new cars in 2010, and in Aichi prefecture and neighboring prefectures in Japan, with 12 car and engine assembly factories from Toyota Motors with more than 2.5 million cars produced a year (cf. figure 1). Fifty-eight interviews and observations (23 firms in Europe and 27 in Japan) constituted the core of the dataset.

The data collection consisted of the narrations and *ex-post* reconstructions of inter-firm relations by company representatives with in-depth interviews and factory observations. Company managers were invited to reflect mostly on the transactions with client firms (implementation of procedures for winning orders and delivering final products), their relations with rival firms (competition with companies in a similar technical segment, and the distribution of tasks with other suppliers), and the acquisition and sharing of technical knowledge (the genesis and deployment of their production management tools and their products). These dimensions emerged quickly as initial codes to be derived from the observations, following substantive and formal theories borrowed from different streams of literature (cf. table 2). In that sense, I did not adopt an orthodox GT approach, my data collection and analysis referred explicitly to an initial analytical framework that in turn referred to previous theories and explanatory schemes.



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Figure 1. Industrial map of the automotive supply chain in Aichi Prefecture, 2015

Table 2. The first analytical framework to collect data

Initial coding	Origin	Target
Duration and nature of the relations with client and rival firms	Transaction cost economics (Asanuma, 1989)	Taking up the story around the modes of transactions aimed at identifying the socioeconomic position of the firm and the nature of the relations with their client firms. It is then easier to cross-reference other data with these negotiated positions to understand the nature of the relationships.
Acquisition and sharing of technical knowledge	Evolutionary Economics (Fujimoto, 1999)	It covers the major events – transactions, product and production developments, negotiations around the technical requirements, quality, and prices – isolated to grasp how suppliers developed their technical know-how. They were either related to the client firms, the internal organization, the economic and institutional environment, or their formal and informal social networks. Skills were also coded from routine to evolutionary capabilities.
Development of social networks and proximity	Economic sociology and social network analysis (Burt, 1992; White 2002)	This operation consists of identifying the partners and delimiting the company's network of actors and the nature of relationships and their evolutions over time. Beyond the mere proximity of client firms, suppliers can benefit from territorialized know-how, from labor pools and skills in the territory meeting their needs, and different social networks of expertise in their direct environment.
Labor process and workplace control	Organization studies and Marxist theory (Braverman, 1974)	I sought to glimpse dimensions that have been hidden, voluntarily or not, in the chronologies and related to the forms of management control and resistance to them. Company representatives necessarily pass over conflictual events with their client firms, failures to bring products to market or the deployment of the Toyota's management tools in their factories that impact their labor processes.

Some initial exploratory interviews carried out during the summer of 2007 oriented the survey to the technical dimension as the main modality, resource, and constraint to the transactions as described above. In turn, major problems encountered in the comparative analysis were twofold. First, due to the case study approach, most of the comparisons were either firm-to-firm or sector-to-sector, which did not allow the results to be generalized. Second, it was difficult to get accounts that rendered more realistic or empirical depictions of the transaction patterns. For instance, I had a biased view of the

inter-firm relations following the common assumption that they are necessarily determined by the suppliers ranks in the supply chain. Roughly twelve years later, I extensively reviewed my data, the dynamic of the fieldwork, with a more accurate awareness of these methodological traps. I attempt below to reconsider another analytical framework that could have emerged mostly from the data as shown in table 3.

Table 3. The dynamic coding of data twelve years later

Focused coding	Interview data
Awareness of technical capabilities	But we realize that the technologies we have used so far could also be used to produce other things. (...) Currently, we are therefore wondering if we cannot also manufacture other parts, and we are trying to have orders from different companies. Companies that can work parts larger than 4 millimeters are rare. In Aichi, there are maybe four or five. So that's our specialty. (...) The presses are big, and the companies are few. There are no more than 5 companies that have this type of machines. And no company has more than two, except us. It is our strength. There are also few 300-ton presses. According to our clients, T., then F. and T.T.. But it's not direct. (...) In fact, according to our customers, they [T] produce parts that are half the size of ours. They're smaller pieces, so we're on slightly different segments. 6, 8 and 10 millimeters. Generally, the limit for auto parts is 5 millimeters. We have almost an oligopoly on this type of parts. (...) As you can see, our pieces have a specificity. For example, we produce a lot for exhaust pipes which are cylindrical and have several shapes. They meander under the vehicle and it is impossible to make plans.
Knowledge transfer and information sharing	We have been working with AAW for over forty years now. They often come to our factories, like today for example. The goal is to remove all sources of waste, and we do not pay AAW to receive these trainings, but they train us for free. AAW helps us to improve some of our weaknesses such as the arrangement of production lines, ergonomics and others.

	In our company, management and quality methods have been developed under the direction of D. In addition, it also allows us to have access to information. Quality management for products at D. is stricter than at Toyota. In the Mikawa area, the most severe is D. and the second is A. Toyota is less severe. When D. receives the plans from Toyota, he systematically reworks them. The plans of A. or TI are sent to us as they were drawn by Toyota engineers. At the same time, they [3 employees] also have training under the direction of TAB, which is shared with other companies. In this way, they learn about the latest orientations and improvements within TAB and pass them on to us.
Entry rights in the Suppliers Associations	The Kyohokai is the association for companies that have a direct production link with Toyota. If this is not the case, it's not possible to be part of it. So for us, it's unlikely. TAB has its own association of suppliers, the Kyowakai. In this association, there are many Kyohokai companies. I am a member of the Kyowakai committee and I can therefore discuss various subjects with Kyohokai companies. (...) For the development of technologies, quality or costs, we meet once a month. Committee members also meet once a month, with the client. We have meetings related to productivity and quality. We have two representatives who provide regular follow-up. It is rare that we meet independently without the participation of A.AW. (...) As for us, it's strange, but working for AAW, we can't deal directly with Toyota, because we work for AAW, it's for that unofficial reason.
Financial control of suppliers	At that time, the client offered two alternatives: either we integrate the suppliers, or we stop the transactions. And to survive, we had to accept having only 10% profit on our sales. If at that time we had obtained 30%, today we might be at 50%. Take for example a part that costs 55.25 yen, we multiply it by the number of delivered parts, and it is only the final price that is revalued. One could round the price of the part to 56 yen, but the client keeps the price at 55.25 yen. The raw materials are all supplied by Toyota. The company supplying Toyota is S. (...) We cannot decide prices. The price of a kilo is fixed in advance. Our client supplies us, so we have to announce how much raw material we use.

Managerial control of suppliers	Before, the production plan was announced 6 months in advance, but recently it is announced every 3 months. Part drawings are not provided. Until now, with the plans, the dimensions were also transmitted to us, but recently we no longer have the dimensions. This is a problem with the welding that we don't know about without the plans. Our customers often come to us. For example, two years ago, every day ten people came to our factories. They come for quality visits but leave with information about our manufacturing procedures.
Oligopolist control of suppliers	For example HS, which manufactures similar parts. It's a large company that notably designs high quality in-house parts. We have several rivals in the region. For AAW automatic transmission valves, there's GK and us. For smaller parts, there are also other companies. Automatic transmissions are also produced by Toyota, and valves are supplied by HS. There are companies under Toyota that make valves cheaper than ours. They are rivals, but we are not in the same categories. Aside from us, companies in our industry and our size have almost all disappeared. Six years ago, we met A., for whom four press companies work. We are in competition with these companies. There will only be one company left, I think. Since we have been working thick parts for a long time, we can easily use these raw materials [high tensile steels]. (...) With the appearance and generalization of high tensile steels, the structure of the world of automotive subcontracting has changed profoundly. (...) Until now small manufacturers with presses were numerous, but with high tensile steels 60-ton presses are no longer effective. You need 100-ton presses. So, recently SMEs that only have small presses cannot survive. Currently, large companies like A. produce a wide variety of parts, and they increasingly think of integrating an increasing number of production pans. In large companies there are a lot of engineers. (...) I wonder why they outsource this since they have enough skills in their methods and planning departments. For A. for example, they'd be able to manufacture these tools overnight. The problem is that if big companies think seriously about internalizing production, we are sure to lose our jobs.

Mechanisms of control avoidance	Client firms find excuses such as quality to come and examine our procedures. They can understand the processes by visiting our factories. For example, to protect ourselves from this, we do not show the parts in progress in our servo presses. The costs are declared to the client and the client checks the veracity of the information by examining on site, in our plants, the actual costs. What we do not disclose to customers are our manufacturing processes, the different stages. This is our expertise and we do not show certain parts. It is our main source of profit, so we have to protect ourselves from customers. Customers right now are looking to reduce the weight of vehicles. So, we are asked to make sure that there is no material inside, but a cavity. The customer makes the cuts of the desired parts and contacts us to find out if it is possible to produce these parts by profiling. We are therefore thinking about setting up a profiling line by defining the number of tools required.
Strategies and logics of cooperation with rival firms	So currently, those who are most to be pitied are commodity trading companies that no longer have customers. Many companies have gone bankrupt. We, the press makers and trading companies, split the profits and when we couldn't balance, we paid the differential out of pocket. It was quite difficult. When they place an order for a part to several companies, we receive the same requirements, we tacitly decide not to lower the price so that there is no competition between us. (...) We discuss between us the distribution of orders according to our specificities. It's the only way to survive in this industry. In Aichi, we often meet between manufacturers of pressed parts and this is a specificity in the region compared to other Japanese prefectures. Yesterday, for example, we had lunch with Kato and three other CEOs of press part manufacturing companies. We exchange information and ask how we can act to meet the requirements of our customers.

Table 3 presents some focused codes from the comparison with each other of data from the same firm, data from different firms, data with open codes, and open codes themselves. This approach allows the exploration of new analytical perspectives and provides hints as identified below.

First, the systematic comparison of data from different cases allows a first level of generalization of the findings. The analysis would therefore be detached from the

socioeconomic context of the firm, to render general trends apart from individual cases, that can be compared to other substantive or formal theories. One main obstacle in the analysis of qualitative data lies in this level of abstraction and the extraction of the results from their cases. For instance, in this type of research, the classification of firms following their ranks in the supply chain, their size, and their segments of production are often used for comparison. With the recoding of the data with no preconception as to the socioeconomic positions of the firms that elucidates their acquired knowledge and their bargaining power, the forms of relations and negotiations instrumental in adapting the technical ensemble to each other's labor processes turn out to be the explanatory variables of these positions. The codes 'Awareness of technical capabilities' and 'Knowledge transfer and information sharing' indicate that to negotiate their positions in the supply chains and acquire knowledge, firms often deploy mechanisms to compare themselves with each other. Those mechanisms are formal quality management and marketing departments, which are not directly connected to the core of the productive activity. Others are directly related to the initiative to develop new technologies independently for production activities. These two forms of development embrace two different trajectories and can be related respectively to two forms of productive models, the 'volume and diversity', and the 'innovation and flexibility' strategies as elaborated by Boyer and Freyssenet (2002). From that coding, the utilization of the literature on the production models at this stage of the analysis could have propelled new research perspectives and new results.

Similarly, while the literature upholds the crucial role of geographic and organizational proximity to explain innovation and acquisition of knowledge, the codes 'Mechanisms of control avoidance', and 'Strategies and logics of cooperation with rival firms' offer a more contrasted view. Long, close and exclusive relations with few and more powerful client firms in a territory are also a threat to the integrity of some actors in a network. The risk of being under the surveillance of the partner and losing its independence and capacity to act autonomously is high in a closed social network with a powerful actor at its core. In turn, comparing these codes with theories on weak and strong ties (Granovetter, 1985) and structural holes (Burt, 1992) is another way of analyzing the behaviors coded in this research. Another line of comparison offered here is with the Italian case where dependent subcontractors federated to free themselves

from the control of some large client firms and gain direct access to the final markets (Piore and Sabel, 1984).

Second, it also generates new findings in comparison with previous studies. The admitted typology of relations inherited from transaction cost economics is refined. The manufacturer-supplier relation is no longer the only dimension to scrutinize. The data showed that in many cases, suppliers that deliver to client firms standardized or more specialized products are in competition with other rival firms or even the client firm on this technical segment. Consequently, the supplier-manufacturer relation needs to be reconsidered, even in Japan where the literature stressed that these relations are characterized primarily by trust. It also offers a new research perspective, that of the dynamic antagonism and interplay between cooperation and competition. Though Asanuma (1989) stressed that firms with and without design capabilities have different relations with their client firms, the three focused codes of control of suppliers indicate that these capabilities are not necessarily that central to eliminate the control of the core firm. It entails that firms with and without design capabilities are often subjected to similar patterns of control, and that the exclusive analysis of the manufacturer-supplier relation needs to be reassessed. The fact that the client firm buys and then distributes the raw materials to its suppliers and uses it to control production output is evidence that steel makers and trading companies should also be taken into account when assessing transaction patterns.

Other findings from the code 'Entry rights in the suppliers associations' indicate that these associations that have been widely discussed in the literature and depicted as core mechanisms of cooperation and a specificity of Japanese organizations (Gerlach, 1992; Miyashita and Russell, 1996), deserve further exploration. One open question is whether their functions embrace that of *keiretsu* or are merely a channel of interpersonal relations that are far from being central in the allocation of resources, job transfers, or financial assistance. In that vein, further investigations in relation to this code can refer to more critical studies on the functioning and roles of these business groups (Miwa and Ramseyer, 2006).

Third, systematic data comparison also shows that technology that can be characterized as a form of materialized knowledge, its acquisition and development, and its sharing and uses can be reinterpreted in parallel with previous studies in the

field of innovation such as Michael Porter's national competitive advantage (1990). Economic investigations mostly focus on the final products, the production processes to assess the technical knowledge of a firm, and its bargaining power. Here, the analysis indicates that technology is not only to be considered as an indicator of performance but is at the core of the transaction behaviors and activities. The relationships between the focused codes 'Awareness of technical capabilities' and 'Financial, managerial, and oligopolistic controls of suppliers' open investigations on the different tools used by the client firms to control *in situ* the labor process in the suppliers' workshops.

Though the majority of previous studies stressed the antagonism between knowledge transfer and its virtuous circle in Japan on the one hand, and the conflicting dimension of control activities and impermeability of firms in the Western world, those codes are indices that the reality is more nuanced in Japan. The three focused codes on control of suppliers and 'Knowledge transfers and information sharing' highlight the difficult and perilous operation for the actors to balance the necessity to cooperate with more knowledgeable and powerful firms without completely unveiling their own capabilities to maintain their positions. Even well-established, long-term and informal relations are not sufficient to explain a supplier's resilience to economic shock, innovation evolutions or the entry of new actors into the field as suggested by the example of the introduction of new raw materials to reduce the weight of vehicles. One can also compare the different forms of control discussed in this coding to enter into a discussion with some Marxist theories on labor control, production of consent, and class struggle (Burawoy, 1979; Edwards, 1979).

By proceeding this way, the social scientist engaged in qualitative data collection and analysis takes distance with the commonly used case-by-case comparison (in this research, firms and inter-firm relations as the units of analysis), and embraces comparisons centered on the relevant dimensions of each data and their relations to each other. In this case, there is no longer any independent variable such as the firm size, the duration of relations, the sector of activity, the tier or rank in the supply chain that might explain similarities and differences. In turn, the commonly accepted conception of a supply chain as a pyramid made up of final assembler down to small-sized or family-owned businesses that produce peripheral and less profitable parts is less appropriate. On the contrary, what appears central is the typology of relations

that contain different dimensions. This interplay between the data, their codes, and the literature helps deconstruct preconceived categories (by the surveyed population and the previous literature) and inspire new research perspectives in a dynamic way.

Concluding remarks

In this essay to reexamine my doctoral research on inter-firm relations in the Aichi automotive industry, the analysis of qualitative data is conceived as a dynamic and iterative process of comparison of empirical data, their codes, and previous theories. Some grounded theorists' assertions that no preliminary and extensive literature review in the substantive field should be carried out before the collection and analysis of data, need to be treated with caution. The review of literature does not only help define the research perspective and focus, but also the analytical framework before entering the field. This requires the social scientist to consider this framework not as a definitive one, and to constantly compare the collected data, and especially data that were seen as insignificant in the literature, with these preliminary explanatory schemes. This ongoing and dynamic comparison of data with the literature guides the researcher to new hypotheses that challenge or confront other theories.

Analysis and comparison of sets of data with each other is not the final stage of research after the completion of the data collection. Analysis is engaged as early as the collection of data from interviews and observations. Grounded theory provides social scientists with relevant tools such as initial and focused coding for that purpose. They allow these data to be extracted from their context and the generalization of the findings to be envisioned in a dynamic manner. The coding plays a central role, it establishes connections, causal relations between data, and hypotheses to be explored and engages the researcher in an iterative process. The coding is constantly questioned regarding its formulations, its pertinence, its appropriateness, and its usefulness. This stance in relation to qualitative data analysis is indeed time and energy consuming, but greatly assists the researcher to interrogate critically his/her dataset, own perceptions of social behaviors and relations under study, and his/her positioning in relation to the literature. The dynamic approach to the analysis of qualitative data as proposed in this essay is one method of the treatment of empirical data and their

interrelations with previous theories that does not necessarily accord with more classic linear and static methodologies.

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