From Factors to Actors: Networks and Network Theory in Comparative Industrial Relations

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Abstract

In this chapter it is explained that industrial relations can be described by networks of different actors. Therefore, social network theory and analyses is an ideal approach to understand industrial relations phenomena and outcomes. It is argued that network approaches are also able to address the challenge that industrial relations are becoming increasingly complex. Against this background in this chapter the reasons why network theories and analyses are ideal approaches to understand research phenomena in comparative industrial relations are explained. On that basis the chapter proposes the use of new methodologies that exploit the advantages of computational methods. More specifically it is argued and explained why simulation methods as agent based models are promising tools for future theoretical and empirical research in the field of industrial relations.

Keywords

Social Networks; Industrial Relations; Complexity; Agent Based Modelling; Methodology

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Introduction

Social networks are a fundamental part of everyone's social and economic lives (Jackson, 2008) and determine how societies function. Since social network are an integral part of our society, they are, of course, also forming and influencing all aspects of our working life. For example, social networks influence how jobs and wages are distributed and set. They are important how we interact with others at work and beyond and are even providing protection. These few examples show that social network structures affect and determine everyone's life at work and the relations between individuals. Of course, these relations include industrial relationships (Passy 2003). In fact, social networks also play a crucial role whether individuals join a trade union or not. They are often key in explaining why individuals participate in collective action and why they join (or not) organizations such as trade unions. The same applies to employers or managers. Very often, the reason why employers act collectively is determined by the networks they form and in which their actions are embedded. Moreover, how wages and working conditions are set is highly influenced by networks. The latter includes individual wage and working conditions as well as collective forms since both trade unions, employers and employers' organizations are also forming networks.

This means that our working and industrial life is characterized by a number of networks. While some networks are small, other networks might be large and complex (e.g., Granovetter, 1973, 1985). In some networks, individual are only connected very loosely and relationship is weak, in others it is completely opposite and the network of individuals involved and the interaction between individuals is highly complex. In fact, many of these networks are highly complex since the interaction of individuals is challenging for any analysis. While, on the one hand, the complexity of human interaction is challenging, on the other hand, it always encouraged researchers to develop new theoretical, methodological and empirical approaches in order to address the challenge (e.g., Sayes, 2014).

Against this background in this chapter the role of networks in industrial relations is explained, the challenges in the analyses are outlined and finally it is explained which new methodological approaches are available nowadays that can improve research in industrial relations in the future.

The complexity of industrial relations

The complexity of social interaction and relationships has ever been of interest in social sciences (e.g., Byrne 1998; Edmonds 1995; Urry 2005). Therefore, also in the wide field of industrial relations (e.g., Elster 1989 a,b). The reason why industrial relation is characterized by a high degree of complexity is that many actors are interacting with each other in different forms and ways as well as on different levels. Using a system theoretical approach such as for example by Dunlop (1944) the main actors in the industrial relations system are employers, managers and employers' organizations on the one side, and employees, trade unions and various other representative bodies on the other side, and beside these two kind of actors there are state or governmental actors. But it is not only the number of different actors that make

industrial relations complex, what makes it further complex is the fact that the processes on how they act and interact are different as well as the actors are often embedded in different contexts.

The fact that actors are often embedded in different contexts, i.e. are influenced by different factors, is especially important for comparative, i.e. cross-country, industrial relations research. Literature that explains and describes industrial relations in different countries (e.g. Crouch, 1993; European Commission 2015; Bechter et al. 2012) clearly shows that the interaction of industrial relations actors can be very different. For example, in some countries the network of actors is relatively small when it is about wage determination, i.e. collective bargaining, since only a few actors on a centralized (e.g. national) level determine wages and working conditions. In other countries the network is relatively large as a number of actors interact at lower levels such as on a company or sector basis.

But it is not only the number of actors involved that matters for the complexity of networks and industrial relations. In fact, the complexity is also determined by the ways and numbers of network links. In other words, how many actors are interacting directly or indirectly with each others. In addition to this, these interactions could also be different since the form and quality of interaction is rarely the same. As regards the latter, the form and quality of interaction could be intense and regular as well as loose and ad hoc.

Without being able to describe all possible forms of interactions and all possible structures of industrial relations networks it is clear that the analysis of industrial relations is faced by a high degree of complexity. Moreover, recent literature (e.g., Brandl and Bechter 2019) showed that the complexity is even increasing. This means that for any researcher it becomes increasingly difficult to understand and explain phenomena. Furthermore, it becomes increasingly difficult for policy makers to coordinate and govern industrial relations as such and in particular also

outcomes of industrial relations. Especially for transnational industrial relations outcomes it appears that the complex network of actors makes any predictions of the aggregate outcomes impossible. Also, the fact that the increasing complexity makes it increasingly difficult to govern and predict outcomes is especially problematic as industrial relations outcomes are an important tool for policy making at an transnational level which becomes increasingly important since economies and societies become increasingly international. So the interesting question and challenge for researchers is: did industrial relations become too complex to understand and are the outcomes of industrial relations actions chaotic?

The paradox of increasing complexity and convergence of actions and outcomes

Literature (Aumayr-Pintar et al. 2014; Brandl and Lehr, 2018) showed that outcomes of industrial relations actors' interactions, such as in particular wages are following the same patters and show an increasing convergence. In other words, the things that industrial relations actors' do became increasingly similar across different countries over time. This was explicitly shown on basis of the development of collectively agreed wages in a number of European countries by Brandl and Lehr (2018) who also argued that this development is somehow puzzling since industrial relations actors who determine wages are very *heterogeneous*, (still) *autonomous*, and are embedded in very different socio-economic and socio-political *contexts* and environments.

As regards the heterogeneity, industrial relations actors in different countries in the world have different 'power' or 'strengths' in how they can influence wages, they play different 'roles' in how they influence wages, they act on different domains such as for sectors, geographical regions or organizations, they have very different organisational structures which explains differences in how they act and they are based on different internal rules and regulations.

Hence, industrial relations actors differ across countries but are also very different within countries. Furthermore, as regards the autonomy of industrial relations actors, the majority of them are not formally or legally obliged in any sense to follow others and they are able to make decisions upon their own interests, preferences, or goals. Especially from a transnational perspective, industrial relations actors are almost entirely able to make their own decisions and are not bound to any transnational constraints. In addition to this, all these industrial relations actors are embedded in very different socio-economic and socio-political contexts or environments in which influences their actions in different ways (Crouch 1993, Ferner and Hyman 1998; ILO and OECD 2020; OECD 2019).

Against this background it is certainly puzzling why (very) heterogeneous and (predominantly) autonomous actors in different environments doing very similar things. So far, literature has paid little or no attention to questions such as: Are these actors interacting with each other? Are industrial relations actors acting in groups/clusters or are there networks of actors? How and why are they interacting? If they are interacting, are they 'coordinating' their behaviour, i.e. their outcomes? Are they 'imitating' each other? Are they 'learning' from each other? One could even ask if there is a hand that guides industrial relations actors.

As regards the latter and in the spirit of Adam Smith (2007) the question then arises if industrial relations actors are guided by a visible or invisible hand? While visible hands could be 'formal' agreements between different industrial relations units (e.g. sectoral guidelines for company bargaining, transnational agreements on wage setting criteria) invisible hands that guide industrial relations actors could be 'informal' coordination/orientation of wage setting (e.g. pattern bargaining across sectors within countries, 'enforced' wage alignment according to main trade partners across countries), or could be the 'looking' at other actors actions and outcomes which could also be either a learning process or a simple imitation. Only with a few exceptions (e.g. Lehr et al. 2015) those different forms of interaction and how behaviours and

outcomes spill over from actors to actors within a network have been rarely analysed in an industrial relations context.

Hence, there are several theoretical explanations or mechanisms that are all possible to explain the puzzling stylized fact that even though the number of actors in industrial relations increases as well as the system of industrial relations is becoming increasingly diverse, e.g. multi-layered and hybrid, there is a convergence in (some important) outcomes of actors' behaviour. Such theoretical explanations are discussed in the following.

Principle theoretical mechanisms underlying the phenomenon of increasing complexity and convergence: Isomorphism and Networks

Industrial relations actors act within different contextual environments. Such different contextual environments are manifold and include different institutional frameworks (including different legal systems), different cultures, traditions and more (e.g. Dunlop 1944). We know, that especially in the field of comparative (cross-country) industrial relations not only the number of industrial relations actors is different and makes the analysis complex, but also the fact that industrial relations actors are embedded in different country systems of industrial relations makes the analysis and understanding of industrial relations highly complex and challenging. As literature on different systems of industrial relations in different countries shows (e.g. European Commission 2015; Bechter et al. 2012) institutions (still) differ across countries as well as across different sectors, which often hinders any convergence of actions and outcomes of different actors (Brandl and Bechter 2019).

Independent from factors that make it difficult for actors that they do the same things, the process that leads actors facing similar factors to do similar things, i.e. that their actions are

converging, is called in literature *isomorphism* (i.e. DiMaggion and Powell 1983). More specifically, there are three theoretical mechanism that explain convergence in actions and outcomes of different actors (e.g. Brandl and Lehr 2018; Jörges-Süß and Süß 2004).

First, there is the isomorphism through coercion or (peer)pressure which arises when other actors exert pressure upon others. Such pressure could be based on economic reasons which often originate because market pressures. One important example is certainly the need in collective bargaining in a company or sector to set wages according to the outcome of wage setting of other companies, sectors or even countries because otherwise companies would lose their competitiveness (e.g. Calmfors and Driffill 1988). Second, there is isomorphism through imitation in the sense that actors mimic or imitate other actors. Such a mimicking behaviour happens when other actors are (more) successful or at least are perceived as more successful. As explained by Brandl and Lehr (2021) there could be many situations in industrial relations where and how imitating behaviour of actors occurs. Also, such a mimicking behaviour of actors is not limited to actors who are facing similar factors but is also important for very different actors. Furthermore, imitation can be expected to be of an increased importance especially in uncertain situations where there is a lack of information on what the outcome and consequences of actors' own actions are. This means that the analysis of mimicking behaviour between industrial relations actors is not only a plausible way in order to understand the puzzle that actors are doing the same things, but it is also an alternative route because previous literature often focused on economic factors. Studying imitation behaviour would also allow to understand and explain how some actions or behaviour 'travels' within a network of actors. However, third, there is also isomorphism due to normative pressure and common values and a similar culture. As regards comparative industrial relations, often similar norms and values are found and associated among actors within on country, but in an increasingly international economy and society, such common values and norms can be based on actors moving across

borders but also on basis of actors forming international organizations within which actors develop and excerpt similar norms. For the latter see examples for trade unions outlined by Erne (2008). However, the fact that increasing globalization leads to an increasing open labour market and industrial relations are becoming increasingly international certainly leads to a convergence in norms, values and cultures of actors.

In sum, all these levelling processes lead to the fact that actors lose their uniqueness and (can) do similar things which lead to similar results, i.e. outcomes. Each of these three isomorphism mechanisms can (consciously or unconsciously / willingly or unwillingly) induces actors to pursue certain actions. Of course, even though similar actions do not necessarily mean that the outcomes are the same. On reason for this is that they are still embedded in different contexts, i.e. different factors matter. Another reason is that because of limited rationality (even in retrospect) actors whether their actions are optimal. Nevertheless, these different forms of isomorphism describe different mechanism that explain that within a network of actors, similar actions are taken even though actors can often be very different.

Even though all the theoretical mechanisms and explanations are convincing by themselves, the challenge for industrial relations research is how these explanations can be investigated empirically or even tested. While such empirical investigations and tests are always challenging in social science, these empirical analyses are especially challenging in the field of comparative industrial relations because of the sheer complexity of the underlying research phenomenon. In the following these challenges are explained in more detail and different approaches used in existing theory compared. On basis of that further and new pathways are outlined and it is explained how these pathways build up (or not) on previous approaches.

The complexity of comparative industrial relations and the “Methodenstreit"

Industrial relations per se and in particular research in comparative industrial relations is faced by the problem that the number of heterogeneous and autonomous actors which are embedded in different environments, i.e. are confronted by different factors, is very high. Therefore also a myriad of possible interactions between actors exists which makes any analysis highly complex and challenging. Although these interactions between actors can be described and modelled by a network and therefore network theory is certainly an ideal approach to investigate research questions in the field of comparative industrial relations, any realistic and meaningful empirical analysis in the sense that it is able to integrate enough observations, still needs to handle and overcome the high complexity which lies beneath the research problem.

Against the background that the complexity of the fundamental research problem is so big, previous research followed a pragmatic and doable approach by very often making use of case study analyses in the sense that "only" a limited and small sample, i.e. a subsample of the total population of actors, is investigated and analysed in detail. This approach is, of course, typical for many social sciences and also characteristic for comparative industrial relations literature in a network related context (e.g., Furåker and Bengtsson, 2013; Gollbach and Schulten 2000). The benefits of country case studies of that kind are certainly the possibility to investigate selected cases in great detail upon which very fine-grained insights and causal mechanisms can be revealed. As mentioned, comparative industrial relations research is not short of analyses which provided great insights and results on that basis over the past decades. However, the disadvantage of that approach is, of course, that the results, insights, and causal mechanisms identified are not generalizable and the theoretical foundation is based on middle range theories in the sense of Hedström and Udehn (2009) and Merton (1967). Research that goes beyond small numbers of cases and observations and are based on larger samples which enable generalizable results are rare even though some notable exceptions exist such as, for example, by Larsson (2012; 2014).

Of course, the wide field of comparative industrial relations is also influenced by research that is based on the idea of revealing generalizable results and is using both theoretical and empirical methodologies accordingly. The identification of generalizable results on basis of general theories has certainly many advantages (Parsons et al. 2001) but, however, the disadvantage of this approach is that this kind of research is that while the findings often did identify generalizable causal mechanisms, these mechanisms were often abstract. Because of the abstract nature of the findings, the results offered only limited insights for specific cases. This means that also research that concentrates on the analysis and identification of generalizable causal mechanisms in comparative industrial relations research is also not able to fully overcome the problems caused by the underlying complexity.

As mentioned, this problem of complexity and the ability of research in social sciences to address this complexity adequately and with the right theory and methods is, of course, not new. As known, in the history of (social) sciences the question on which methods, theories and methodological approaches are preferably has lead not only to numerous discussion and controversies which are well documented in the "Methodenstreit" (e.g., Kilpinen 2004; Swedberg 1990), but has also motivated researchers to come up with new ideas and suggestions on what can and should be done (e.g. Bailey, 1991).

Although history of (social) sciences shows that progress has been made and from a methodological perspective (social) sciences overcame many previous obstacles, there is no clear answer in the "Methodenstreit" and the question which methodological approach is preferable. Still both approaches are important and have led to important research findings not only in comparative industrial relations literature but in social sciences per se. However, when looking at literature on both approaches it appears that both strands are detached from each other. It appears that the only common ground they share is that they acknowledge the high degree of complexity of the underlying research questions but they disagree in the way how

research should address the complexity. But is there no way to combine both approaches and is there no alternative method to capture this underlying complexity?

In the following it will be argued that computer simulation methods such as in particular agent based models are not only able to handle the complexity underlying the research problem, but such methods are also able to integrate very different empirical data and information (e.g. Bruch and Atwell 2015; Edmonds 2015). These different forms of data and information include both qualitative and quantitative empirical material which can be combined and integrated in a meaningful way which, at the end, can even lead to a comprehensive and holistic understanding of the research problem. However, before these new computational methods are explained in more detail the theoretical concepts which are needed for the analysis are outlined in order to understand the link between empirics and theory.

New theoretical and methodological pathways offered by computational social sciences

Previous literature in the field of industrial relations has focused very much on looking at the factors producing outcomes and have missed to look enough at the actors and their interactions via networks. Even though this approach on concentrating on factors has certainly its merits, industrial relations systems can be seen as a system, i.e. network of actors, who are interacting with each other in many ways. While, on the one hand, describing industrial relations as a network is not only obvious but also preferable for any analysis, on the other hand, any analysis is challenging since the network of actors is highly complex.

However, the underlying complexity the field of (comparative) industrial relations is facing is not unique, but the analysis of complex networks, i.e. systems, is an immanent issue of (social) sciences, for which in recent years various methodological approaches were developed.

Especially from methodological research in the area of *computational social sciences*, which offers a number of prospective new approaches which allow the simulation of social processes that can be used in many fields of social sciences including, of course, industrial relations.

More specifically, as for example explained by Salgado and Gilbert (2013), progress in computational social sciences in the recent past has enabled researchers methods that allow the modelling of social processes based on the idea about the emergence of complex behaviour from simple actions within networks of actors. Computational techniques allow researchers to study emergent orders or patterns in behaviour that arise from local interactions across many heterogeneous and autonomous actors whose actions influence each other (De Caux et al. 2014). This means that the idea behind matches exactly with the research problem (comparative) industrial relations is faced with. These methods can model and simulate the individual and aggregate outcomes and effects of micro-level actors and therefore help to generate and understand macro-level phenomena on basis of individual actions.

Nowadays, computational social sciences provides researchers with a number of different (simulation) methods which all have different advantages and disadvantages for different research questions. Among these different methods, as explained for example by Brandl and Lehr (2018) one promising and especially useful methodological approach for comparative industrial relations is the so called *agent based model* (ABM) methodology which developed as one of the most appealing and used approaches in social sciences in recent years (e.g. Gilbert and Troitzsch, 1998; Gatti et al. 2010) not least because its advantages are emphasized by a number of prominent researchers (e.g. Axelrod, 1997; Farmer and Foley 2009; Stiglitz and Gallegati 2011). While the former advocates of the use of ABM use examples from various fields of social sciences, also early advocates in the field of industrial relations exist. Most notably by Richard Freeman (1998).

The reason why in recent years many researchers advocated ABM is that its idea is very appealing. More specifically the reason why it is appealing is that ABM concentrates on the action and interaction of actors which are called agents within a network and it rests on four simple principles (Brandl and Lehr, 2018; Macy and Willer, 2002): First, actors are autonomous and are making their own decision on basis of their own interests. Second, actors are interdependent in the sense that they only consider actions of other actors in the network as important for their own actions if they want, i.e. if it is in their own interest. Third, actors action and behaviour can be modelled on basis of rules, i.e. as a function. Fourth, actors are not static but adjust their behaviour and actions. This means that the rules can change over time by adapting from past experiences. In other words, actors learn from their past actions.

Furthermore, ABM reflect Coleman's methodological boat (Coleman 1986, 1990) as the analysis is not only about actors but also about factors in which actors' are embedded and which influence actors' behaviour and actions. This means that actors and factors are combined and integrated in a common framework of analysis but the essence is that social dynamics and macro-phenomena are explained and modelled as a bottom-up approach (Macy and Flache 2009). More specifically, as outlined by Brandl and Lehr (2018) the heart of the ABM approach is on the bottom of the boat, i.e. in the causalities of individual action and interaction. After defining the basic characteristics of the actors and their actions and interactions, the artificial industrial relations system can be "left alone" and actors can act and interact according to the defined rules. Outcomes at different levels (including the macro-level) such as wages and the wage share can then be easily calculated. The link from the micro-level to the macro-level emerges through the interaction of the actors (Epstein 1999). Of course it is possible to test theory. If the theoretical actions and interactions do not match with the observed macro-outcomes there is something wrong with the micro-theoretical model. There are of course many reasons why a theoretical model is "wrong", i.e. why the model is not able to explain 'empirical

observations'. Either there could be something 'wrong' with the basic assumptions, or with the empirical calibration, i.e. the empirical weights of the relevance of different goals and/or the network links. The quality and reliability of the calibration is very much dependent upon the availability of empirical information. One major advantage is that in the calibration of ABM is that various qualitative and quantitative information can be integrated (e.g. Yang and Gilbert, 2008). Apart from the fact that this way of developing a theoretical framework is highly beneficial for the advancement of theory itself (e.g. Krause, 2013) it is also beneficial for a superior empirical analysis and for theory testing. This is because the ABM can make use, integrate and combine information, data and knowledge from case study, i.e. country study research on how trade unions in different countries are characterized and how they act and interact with other trade unions.

Of course, ABM cannot solve all problems even though this chapter aims to convince readers that ABM is advantageous and the advantages offered are not exploited in the research community sufficiently. But, of course, ABM comes also along with a number of limitations which are mainly based on the 'artificial' environment and the level of abstraction that is used. Hence, for different kind of research questions different methodological approaches are useful and ABM is certainly not preferable for all research questions but ABM is especially advantageous in analysing and explaining complex phenomena that lack central coordination. Thus ABM can be very helpful in understanding transnational, e.g. European, industrial relations where there is no (strong) central coordination of actors. Trade unions, employers and employers' organizations in different countries in the world are (knowingly or not) interacting with each other but their interactions are (predominantly) not coordinated with each other. This interaction is also embedded within an environment that is also complex and multi-layered. There is no 'visible or invisible' hand that 'captures', 'controls', or 'guides' their actions. In fact their actions and phenomena emerge in the complex and multi-layered system (Keune and

Marginson, 2012; Marginson and Sisson 2004) of interaction. However, once an ABM is defined and specified it is able to describe and explain current and past phenomena in industrial relations and it can be very useful for testing as well as simulating different scenarios.

In other words, ABM offers a method to analyse different hypothetical configurations of actor's interactions based on different assumptions and possibilities. It allows to give very precise information about what would be if this and that is different or is changed (Casti, 1996). Thus it is useful for theoretical and empirical informed public policy making and institution building (Bourguignon and Spadaro, 2006; Gilbert et al. 2001). This means that ABM would allow researchers and policy makers to evaluate different policy options and therefore balance different advantages and disadvantages before making any decisions which are often irreversible.

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