Functional Reconstruction and Practice Innovation of Modern Labour Relations in Collective Bargaining

Jeff Zhehan Zhang*

Harrow International School Hong Kong, New Territories, Hong Kong, 999077, Hong Kong SAR

*Corresponding author: 0220202839@harrowschool.hk

Abstract. Since the industrial revolution took place back in the middle decades of the 18th century, labour, as a major share of the factors of production, was affected by a shift in the power dynamics of negotiation power and substitutability in productions. Industrialisation as a process of boosting production capacity and efficiency actively replacing labour with capital equipment of lower cost often results in the loss of bargaining power of labour in terms of working conditions, wage and other necessary benefits. The erosion of traditional bargaining power under modern processes of industrialisation, digitalisation and industrial transformation requires mediation for functional transformation through innovative practices in collective bargaining to maximise and maintain labour welfare. The said topic will be explored through a comprehensive analysis of quantitative and qualitative research methods such as cooperative game theory and integrative bargaining theory in order to empower labour unions and individualised welfare. Taditional forms of collective bargaining may often be revitalised through integrative methods and cooperative mechanisms. With this said, functional reconstruction requires both institutional innovation and adaptive strategies in emerging labour contexts.

Keywords: Collective bargaining; labour relations; game theory; digital economy; institutional innovation.

1. Introduction

The continuous evolution of global economic structures, especially with the rise of digitalisation and service-based industries, has significantly reshaped labour dynamics and collective bargaining processes. While traditional collective bargaining mechanisms played a critical role during the industrial era, contemporary labour challenges—such as gig work, algorithmic management, and employment precarity—have highlighted the urgent need for functional reconstruction. This study investigates how modern labour relations can be adapted and restructured through innovative practices of collective bargaining.

The research adopts a dual-method approach. Theoretically, it draws from cooperative game theory and integrative bargaining concepts, which emphasise mutual benefit and collaborative negotiation. Empirically, it analyses the case of IG Metall's partnership with Volkswagen to demonstrate how cooperative bargaining functions in practice. This mixed-method strategy allows for both conceptual understanding and real-world validation.

Findings of the study highlight that cooperative bargaining not only protects workers' rights but also increases productivity and organisational sustainability. Case evidence from Germany demonstrates that collaborative labour models can produce Pareto-efficient outcomes, maintain employment security, and support industrial transformation. However, the study also identifies institutional and legal gaps that prevent broad implementation across gig economies and fragmented labour markets.

In conclusion, the research supports a shift from adversarial to integrative labour relations, advocating for legal reforms, algorithmic transparency, and the development of digital-age bargaining institutions. Such innovations are necessary to ensure that labour representation remains effective, inclusive, and sustainable in the face of rapid economic transformation.

2. Transformation of Bargaining Methods

2.1. Historical Transformation and Decline of Traditional Bargaining

Collective bargaining as defined by the Trades Union Congress is the official process by which trade unions negotiate with employers, on behalf of their members [1]. The act of collective bargaining overshadows the effectiveness of individualised bargaining since a group negotiation gives the bargain more power in labour demands. Key aspects of labour side negotiations often include but are not limited to: wages, working hours, job security, health and safety conditions and benefits. Collective bargaining power provides a levelled playing field between labour and capital. During the post war industrial era, between the 1950s to the 1980s, collective bargaining acted as a decisive instrument in managing labour relations in manufacturing based economies. Industrial sectors such as coal, steel and automotive manufacturing employed large and geographically concentrated labour who performed repetitive tasks under standardised conditions. These conditions facilitated the formation of centralised and powerful trade and labour unions negotiating with employers representing workers [2].

2.2. IG Metall Union Case Study

A case study given in Germany, the IG Metall union exemplified effective sectoral bargaining. It negotiated on behalf of workers in firms such as Volkswagen, achieving improvements of wages, reduced working hours and the implementation of job transitional programmes to strengthen worker mobility between labour sectors. The outcomes of such collective negotiations often reflect mutual benefits between the labour and employers as players, portraying a real life reflection of a 'social partnership model' [3]. This emphasises cooperation in contrast to a conflicted approach between labour and capital.

In the dynamic landscape of capital technology development, structural shifts in the global economy of employment from traditional manufacturing towards service orientated and digital sectors are inevitable. This contemporary transformation had provided the opportunity for the rise in the gig economy, where work is typically short term, flexible, and mediated by digital platforms such as Uber, Deliveroo, and TaskRabbit [4].

2.3. Analysis of the Modern Decline in Traditional Bargaining

Jobs within the 'gig economy' significantly differs from traditional employment. Workers associated with the gig economy often have no centralised workplace, with indefinite working hours and are commonly dispersed across urban geographies. A significant percentage of gig economy workers are classified as contractors rather than company employees. This offsets the public efforts of providing employment and security benefits such as minimum wage protections, paid leave or unemployment insurances. Furthermore, the allocation of work and performance evaluation of its workers are all operated under algorithms which lack transparency and recourse for workers.

A key challenge which involves the compromise of a gig worker's bargaining power is the absence of traditional worker protections since their classification of employment falls beyond the jurisdiction of National Labour Laws. Worsening the issue, unionising the workers face major obstacles since workers do not share a common physical working place, lack employment protections and a formal grievance mechanism. This creates a significant representation gap in contemporary labour markets. Traditional trade unions struggle to adapt to a digital and fragmented workforce. Though, new forms of labour unions and organisations such as app-based unions or sectoral alliances are emerging but remain confined with its scope and magnitude of action.

3. Bargaining Theories Analysis

3.1. Cooperative Game Theory

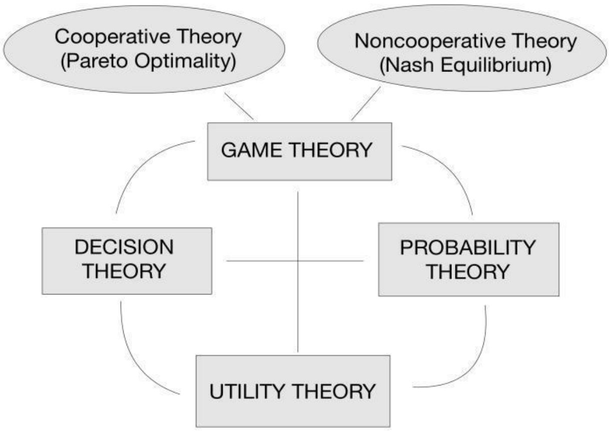

Fig. 1 Game Theory Analysis

Cooperative Game Theory (CGT) is a branch of economics and mathematics that explores how groups of individuals, otherwise players, can form collaborative bodies to achieve mutually beneficial outcomes. Differing itself from non-cooperative game theory, cooperative game theory assumes that negotiation and agreements are possible leading to minimal or no concessions on either side [5] . Players are committed to shared strategies and allocate outcomes which provides maximised welfare balanced between parties. In the context of labour relations, cooperative game theory provides a useful framework to analyse employers and workers to engage in collaborative problem solving rather than adversarial bargaining [6]. It is able to offer an alternative to traditional zero-sum models of negotiation when only one party's gains are assumed to be another's losses. Instead, it suggests that employers and employees can 'grow the pie' by identifying shared interests and being able to distribute their gains evenly in a sustainable manner [7].

The usefulness of cooperative game theory in labour relations has seen growth in relevance due to the increasing complexity and fluidity of the modern economy and technological advancements. Employers and workers face common challenges: adapting to automation, managing skill gaps, and maintaining productivity in rapidly changing environments. In such contexts, cooperative approaches create the opportunity for joint problem solving between stakeholders. For instance, employers gain from a more motivated and skilled workforce, meanwhile, workers benefit from greater job security and upskilling opportunities. This aligns with the empirical findings that cooperative bargaining practices are positively associated with higher productivity, reduced turnover and greater workplace satisfaction. This all complements national efforts in workplace improvements. In Germany, firms with active works councils are 16% more likely to invest in employee training, and report 25% higher job satisfaction among employees compared to non-unionised firms. [8]

3.2. Case Study: Volkswagen and IG Metall

Volkswagen's transition from internal combustion engine (ICE) vehicles to electric vehicles (EVs) represents one of the most significant structural transformations in the automobiles industry. The transformation marks not only an evolution in technological platforms but also employment structures. EV production only requires 70% of the parts that an ICE vehicle requires. This threatens tens of thousands of traditional manufacturing jobs across Europe and in automobile industries around the world. [9] Germany's largest industrial labour union IG Metall represents over 2.2 million workers, and played a pivotal role in managing this transition. Rather than opposing changes to take place, IG Metall engaged in proactive negotiations with Volkswagen to ensure that workers are not left behind.

The union established agreements of job guarantees for 120,000 workers until 2029 and 1 billion Euros worth of investment in retraining and digital upskilling for union workers [10].

This case exemplifies the principles of cooperative game theory through coalition building, reaching the Pareto efficiency and facilitating the Nash Bargaining Solution. IG Metall and Volkswagen formed a coalition with shared long term goals of decarbonisation, competitiveness agreements and employment security terms to ensure the conditions of mutual benefits are met. The retraining programmes ensured that workers were not made worse off, while Volkswagen retained experienced labour for future EV lines. The resulting agreement can be viewed as meeting the Nash equilibrium in which neither of the parties had an incentive to deviate from the cooperative agreement, given the high costs of industrial conflicts and possible labour strikes.

Despite global layoffs in the auto sector, Volkswagen's German plants and subsidiaries reported 0% of net job losses in 2022, while competitors such as Ford and Stellantis had to cut labour employment by 15-20% [11].

4. Challenges and Institutional Reform

While the Volkswagen-IG Metall case demonstrates a potential for future cooperative bargaining, several structural challenges may inhibit widespread adoption of such models. One of the major challenges include power asymmetries. In many contexts, especially within the gig economies, employers hold disproportionate power due to being data monopolies and the nature of legal ambiguity. Platforms often control access to performance metrics, task allocation and payment restructuring algorithms. While gig workers often are excluded from collective bargaining rights due to their classification as independent contractors as given by the national labour laws worldwide. This institutional weakness resulted in collective bargaining coverage falling to less than 25% of the workforce in liberal market economies such as the UK and the US.

To enable broader adoption and utilisation of the cooperative bargaining model in both traditional and digital sectors, this study recommends the acts of legal reforms and data transparency mandates. This will help extend collective bargaining models in both traditional and digital sectors, to platform workers by redefining employment status or creating a third category of 'dependent contractors. Digital platforms disclosing payment and performance calculation algorithms to worker unions and employees will further enhance job security and performance satisfaction levels.

5. Conclusion

This research analyzed the expected impact of cooperation and integrative bargaining approaches on changing the nature of industrial relations for the 21st century. Unlike the typical hostile models which consider labor and capital as implacable adversaries, this study demonstrated that trust, collaboration, and problem-solving within groups can result in win-win situations. Using concepts from cooperative game theory and integrative negotiation, the study provides a rationale and evidence for reconceptualization of collective bargaining processes that shifts the focus from conflict to cooperation.

The case studies analysed, especially the Volkswagen–IG Metall relationship and the influence of works councils in Germany provide examples of how these concepts are implemented. Volkswagen's shift to electric vehicles threatened to eliminate the traditional value added manufacturing jobs. However, the company together with the union negotiated and restructured proactively, invested in retraining, and reached what is called a cooperative negotiation settlement that protected jobs, enhanced productivity, and allowed for industrial change. In the same way, the institution of works councils in Germany has been shown to increase firm performance, decrease employee turnover, and increase employee participation which are all desirable outcomes of cooperative industrial relations.

The findings show that cooperation is not only achievable, but is especially productive when backed by institutional mechanisms that provide for transparency, representation, and credible commitments. The study addresses ongoing controversies regarding the future of work by presenting a practical and adaptable framework for social collective agreement negotiations which integrates economic competition and social inclusivity. It demonstrates the need for institutional flexibility as well as strong worker agency for the enduring viability of contemporary labour markets.

Nevertheless, the research addresses all fundamental restrictions and obstacles as well. Some industries – particularly those with large volumes of platform or informal work – do not have the necessary structural support for cooperative bilateral negotiations. The same goes for gig workers, delivery drivers, domestic workers, among others. These workers live in a legal grey area under algorithmic management and have very little means of representation. These obstacles limit the feasibility of cooperative approaches and require bold structural change. In the long term, the study outlines a number of interesting possibilities for future research and policy action. First, there is work to be done looking at the impacts of algorithmic governance and data power asymmetries on the bargaining power of workers in online platforms. Second, the role of new emerging technologies can also be analyzed. Furthermore, the use of new technologies like enforcement of contracts via blockchain, AI-powered negotiation assistants, and digital identity systems can, to some extent, facilitate employment agreements that are more transparent and inclusive. Another important issue is the urgency of extending the application of cooperative models to the more neglected stratum of the society which includes the care, teaching, and the informal service professions lacking union representation.

To sum up, this research supports the idea that cooperative and integrative bargaining frameworks are productive in dealing with the challenges of the contemporary world of work. They help participants move from adversarial to cooperative approaches and from shallow to deep sustainability. There must be accompanying institutional, technological, and policy changes in the provision of work to ensure every worker, irrespective of industry and employment type, has the opportunity to actively build just and sustainable societies.

References

[1] Trades Union Congress (TUC). Collective bargaining. Trades Union Congress, UK. (no date).

[2] Thelen K. Varieties of Liberalization and the New Politics of Social Solidarity. Cambridge University Press, 2014.

[3] Streeck W. Social Institutions and Economic Performance: Studies of Industrial Relations in Advanced Capitalist Economies. Sage Publications, 1992.

[4] De Stefano V. The Rise of the "Just-in-Time Workforce": On-Demand Work, Crowd Work and Labour Protection in the "Gig-Economy". ILO Conditions of Work and Employment Series, 2016.

[5] Khalil E L. Game Theory Interrelationship Diagram. In: Game Theory and Economic Modelling. ResearchGate, 2005.

[6] Hayes A. Game Theory: A Comprehensive Guide. Investopedia, 2024. [Online] Available: https://www.investopedia.com/terms/g/gametheory.asp

[7] Osborne M J, Rubinstein A. A Course in Game Theory. MIT Press, 1994.

[8] Addison J T, Schnabel C, Wagner J. Works councils in Germany: their effects on establishment performance. Oxford Economic Papers, 2001, 53(4): 659–694.

[9] Boston Consulting Group (BCG). Electric Cars and Employment: How the EV Transition Will Reshape Jobs in Europe. BCG Report, 2021.

[10] Volkswagen AG. Annual Sustainability Report. Volkswagen Group, 2022.

[11] European Automobile Manufacturers' Association (ACEA). Employment Trends in Europe's Automotive Sector. ACEA Report, 2023.