

THEORY CONSTRUCTION IN INDUSTRIAL RELATIONS: A SYNTHESIS OF PDR SYSTEMS

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The purpose of this paper is to develop a ground theory to analyze and diagnose industrial relations, which is defined as a synthesis of production, distribution and rule-making systems. The model is developed by the method of 'systems analysis' of the institutional school. This paper proposes a new view of production theory and industrial relations theory. As the theory introduces the concept of a humanware system in the production system, it sheds light on the development of production theory and a synthesis of industrial relations and human resource management. This paper, in particular, discusses the mechanism which environmental factors affect the PDR systems. The paper also discusses the concrete contents of the subsystems of the PDR systems and the dynamics of the model.

I. INTRODUCTION

The main purpose of this article is to develop a conceptual framework to examine industrial relations from the perspective of the synthesis of production, distribution and rule-making systems (hereafter referred to as PDR systems). Within the framework, therefore, the PDR systems are subsystems of industrial relations systems. Employers hire workers for production, and workers perform productive activities in return for a share of the value of the product. This employment relationship fosters a community in which rules are established consciously or unconsciously. Therefore, we can define industrial relations at a firm level as "socio-economic and legal relations between employers and employees involving production, distribution and rule-making systems in an organization within the context of a given environment and a set of government policies."

There is no distribution without production and no production without distribution in organizations with employed workers. This notion is termed the 'indivi-

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sible principle'. A fair and satisfactory distribution encourages workers to enhance productivity, and an unfair and unsatisfactory distribution discourages them, because human beings have selfish and moral sentiments. This notion can be referred to as the 'reciprocal principle'. In this context, a company is a community where employer and employees should be jointly responsible for production and distribution. In an industrialized society in which employed workers produce most goods and services, both production and distribution are greatly influenced by industrial relations at a national level as well as at a firm level. This means industrial relations determine both the production level and the quality of life in a nation as well as in a firm.

However, both practitioners and policy makers have never fully recognized the importance of industrial relations. Most studies have analyzed industrial relations from the perspective of conflicts between employer and employees or human resource management (factor-management perspective) rather than as a synthesis of production and distribution. As a result, they have failed to show practitioners and policy makers the positive effect of industrial relations on production and its major role in the distribution system in an industrialized society. Traditional approaches, which were based on a dichotomy of production and distribution, focused on analyzing the actors' conflicts in distribution and solving these problems.¹⁾ In fact, there is a variety of actors' conflicts and cooperation for every subsystem of industrial relations. Many employers also think labor as only factors of production such as capital and land, in which the quality of labor force is conceived to be determined *ex ante* and fixed. However, the quality of labor force always varies because it is a creative resource that has intangible assets, namely the workers' 'mind' and their latent abilities, in contrast with endowment resources of capital and land.

To analyze industrial relations generally and dynamically, we need to establish a theory beyond the conventional dichotomy of production and distribution, and to look beyond the perspective of seeing labor simply as a factor of production.

The new departure is to develop a theoretical framework about the synthesis of PDR systems in industrial relations. As with most theories of industrial relations, the one introduced in this paper also follows the institutional paradigm. The model is basically developed by the method of systems analysis of the insti-

¹ Most traditional approaches about industrial relations have concentrated on the conflicts between employer and employees, and institutional rules governing the pricing and allocation of labor without considering production systems. These approaches lead to a dichotomous way of thinking in which industrial relations is basically separated from the production system. They perceive industrial relations from the perspective of industrial peace or conflict rather than the positive effect it has on production. The dichotomy causes people to believe that industrial relations is not an important company issue until conflicts or labor disputes occur.

tutional school. In Slichter's language, "Our arrangements in the field of industrial relations may be regarded as a system in the sense that each of them more or less intimately affects each of the others so that they constitute a group of arrangements for dealing with certain matters and are collectively responsible for certain results." (Dunlop 1993, p. 13).²⁾

Special attention will be paid to analyzing the contexts of environmental factors in industrial relations, and their effects on the actors' values, power positions and strategic choices. A description of the three essential concepts of production systems, distribution systems, and rule-making systems (PDR systems) and an explanation of how they are synthesized will be provided. Following that will be an examination of the macro-model and the dynamics of PDR systems. To complete this paper, final discussions and conclusions will be presented.

II. BACKGROUND: THE TRADITIONAL MODEL AND THE STRATEGIC CHOICE MODEL

Several "partial" theories that focused on specific facets of industrial relations behavior were advanced after Commons's (1909) theory of the extension of markets and trade union development, but no one before Dunlop (1958) had attempted to construct a conceptual framework that integrated and systematized the disparate parts of the field into a coherent whole (Kaufman 1993, p. 100). Dunlop's theoretical framework focuses on the external environment (e.g., technology, the market and power), the key actors (labor, management, and the government) and their interactions, and concludes with an explanation of the rules governing employment relationships that evolve out of these interactions. A shared ideology among actors secures stability of the system. His model is framed almost entirely in terms of unionized employment situations (Kaufman 1993, p. 101), and has a difficult time explaining the dynamic aspects of industrial relations (Kochan, Katz and Mckersie 1994, p. 7). Dunlop (1958) omitted almost entirely a discussion of nonunion settings, human resources management, internal dynamics of the organizational structure, and the production system within the industrial relations system.

Since Dunlop (1958), several notable attempts at theorizing have been done by Somers (1969), Fox (1974), Hyman (1975; 1994), Kochan, Katz, and Mckersie (1986), Adams (1993). Kochan, Katz, and Mckersie (1986) developed a three-tier strategic choice model, which classifies the activities of management, labor, and government organizations into: (1) a top tier of strategic decision making, (2)

² Borrowing Slichter's language, Dunlop (1993, p. 13) states "the concept of systems does not necessarily carry the connotation of an explicit design, planned order, or legislation. But the central notion of a system is that the parts and elements are interdependent and each may affect other elements and the outcomes of the system as a whole."

a middle or functional tier of collective bargaining or personnel policy making, and (3) a bottom or workplace level tier, where policies are played out and affect individual workers, supervisors, and union representatives on a day-to-day basis (Kochan, Katz and Mckersie 1994, p. 16). This framework overlaps with Dunlop's in that it emphasizes the importance of the external environment in which the industrial relations system is embedded, but it also elaborates on the different levels of decision-making in the system, the role of business strategy, and the interdependency of the union and nonunion sectors (Kaufman 1993, p. 149).

The PDR framework developed here builds on previous industrial relations theories in a number of ways. Following Dunlop (1958), it recognizes that enterprise industrial relations are embedded in a broader environment that shapes the power relations among the key actors—workers and their unions, employers, and government. The PDR framework also builds on the strategic choice model of Kochan, Katz, and Mckersie (1986), by stressing the decisions that shape production processes and their associated industrial relations practice.

III. THE THEORETICAL FRAMEWORK OF PDR SYSTEMS

1. Simple Framework for Analyzing Industrial Relations³⁾

Scholars, practitioners and policy makers in industrial relations are encountering difficulties in trying to understand a wide range of complex problems. To understand the basic mechanism of the complicated phenomena, we should identify the essential parameters and the significant aspects of human behavior, and a set of interrelated causal processes among the elements.

As we already discussed, industrial relations start when an employer hires workers for production and workers execute productive activities to earn a share of the value of the product. Production and distribution are done under systems that are established and orderly. These are identified as the production system and the distribution system, both of which require an organization. The organization needs a rule-making system that molds and manages it in an orderly fashion. This means that industrial relations issues are basically about production distribution and rule-making systems in a unit. Therefore, an industrial relations theory should be focused on the working mechanisms of these three systems.

The simple theoretical framework guiding the analysis of industrial relations

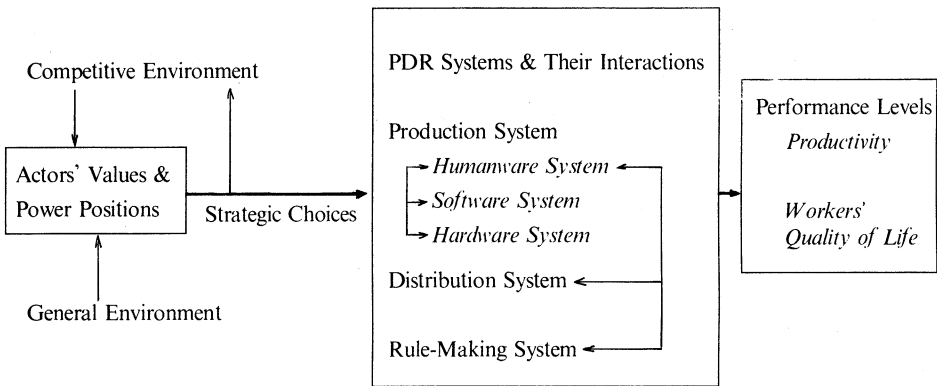
³ Lee, Hyo Soo (1984) also developed a theoretical framework of labor market by the same approach used in this paper. According to the theory, the labor market consists of three actors, and the actors map out their strategies considering the three environmental factors of the labor market. Their strategies are to change the three factors characterizing the labor market structure. As a result, the structure of the labor market is formed and changed by the interaction effects among these three factors.

is presented in Figure 1. The heart of the PDR model focuses on the actors' strategic choices for PDR systems, their cooperation within the systems, and matching mechanisms among the PDR systems.

Like traditional industrial relations theories, the model starts with consideration of the relevant forces in the external environment that affect industrial relations. Unlike the traditional theories, however, the environmental factors in this model are discussed concretely rather than in the abstract, and they are classified into two groups: competitive environment and general environment. The competitive environmental factors could be objects of actors' strategic choices because they are relatively selective for an individual unit, whereas the general environmental factors are not the objects of actors' strategic choices since they are relatively common for all actors within a country. Both the competitive and the general environmental factors strongly influence actors' values and power positions. The actors' values determine the sphere of strategic choices which they may consider. The range of the effective strategic choices depends on their power positions. Actors use two kinds of strategies that affect industrial relations. One is to strengthen their power positions through means such as union organization strategies or strategies for the competitive environmental factors, and the other is to form or alter the contents of the PDR systems.

The essence of the framework presented here is to see industrial relations as a synthesis of production, distribution and rule-making systems. The production system, with particular emphasis on the humanware system, is synthesized with the distribution and the rule-making systems through the humanware system. The levels of the PDR systems and their interactions determine the performance levels of industrial relations such as productivity and the workers' quality of life.

[Figure 1] Simple Framework of PDR Systems in Industrial Relations



At the heart of this theoretical framework lies the need to improve the distribution and rule-making systems so they can balance with the production system to create a high performance production system. The reason is that the production system is a synthesis of humanware, software and hardware systems, and the humanware system is heavily influenced by the distribution and rule-making systems. An imbalance among the PDR systems generates actors' conflicts and low performances. This means that the production system should be balanced with the distribution and rule-making systems in the long run.

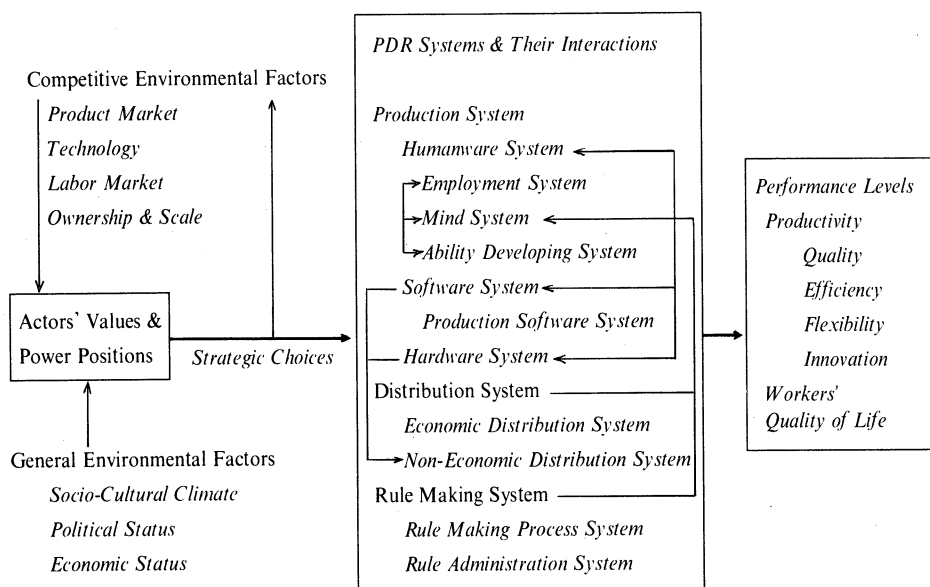
2. General Framework for Analyzing Industrial Relations

To take up these points of the simple model in detail, the general theoretical framework to analyze PDR systems in industrial relations is presented in Figure 2. The propositions underlying this model will be elaborated in the latter part of this section: environmental factors and actors' values and power positions, actors' strategic choices and contexts of PDR systems, and the interactions of PDR systems and the performance levels of industrial relations.

2.1 Actors in Industrial Relations

For the study of enterprise industrial relations, employers and workers are

[Figure 2] General Framework of PDR Systems in Industrial Relations



seen as the primary actors. The first category, the employer, is a hierarchy of managers and their supervisory representatives, to use Dunlop's language. The hierarchy of managers need have no relationship to the ownership of the capital assets of the workplace; the managers may be public or private or a mixture of the two in varying proportions (Dunlop 1993, p. 47). The second category of actor in every industrial relations system consists of workers or employees and the formal and informal arrangements into which they are organized (Dunlop 1993, p. 13).

The function and role of government in industrial relations are also very important, even though the government is a secondary party. The government can affect PDR systems as well as primary actors' strategic choices through labor laws or various policies according to the degree of intervention, although it is not a direct counterpart to PDR systems at the company level.

2.2 Environmental Factors and Actors' Values & Power Positions

Environmental factors have a strong influence on forming actors' values and the locus and distribution of power positions among actors. As already discussed, actors' values determine the sphere of strategic choices which actors may consider. The range of the effective strategic choices depends on their power positions. Actors with weaker positions have very limited strategic choices. If an actor utilizes a strategy against the environment, the strategy might fail. Therefore, actors should create new strategies in response to an ever-changing environment, considering its influence. Industrial relations theory also should contain the mechanism of environmental factors on industrial relations. The mechanism in this model is that environmental factors affect actors' strategic choices for PDR systems through their effects on actors' values and power positions.

As has been discussed, environmental factors consist of general environmental factors and competitive environmental factors. The former are socio-cultural climate, economic status, and political status. The latter are product market, external technology, labor market, and ownership and scale.

Both the general environment and the competitive environment are very similar in that they affect the actors' values and power positions. But, the effects of the competitive environment upon industrial relations are quite different from those of the general environment in two ways. The first difference is that the competitive environmental factors are the environment on the one hand and objectives of actors' strategies, especially, business strategies (the second upward arrow in Figure 1 and 2) on the other hand. The second difference is that a change in the competitive environment is more rapid than that in the general environment, and an organization may suffer negative consequences if it is unprepared for change.

2.2.1 General Environmental Factors

Although the general environmental factors are very similar in that they indirectly affect the PDR systems by influencing the actors' values and power positions, the mechanisms as well as their effects on industrial relations are different.

Socio-Cultural Climate: The socio-cultural climate plays the most important role in shaping common sense and the social norm within a country. The social norm and common sense create not only an invisible order but also the standard of fairness or justice in the society. If an actor's strategies are against common sense or the standard of fairness in the society, they cannot be realized successfully. Therefore, actors should consider the socio-cultural climate when they make strategic choices. Common sense and the social norm stem from the interaction of various ways of thinking and modes of behavior among individuals in a given society. An actor's way of thinking is heavily influenced by the family system, education, and human relations in the society. Therefore, the family system, religion, and education system should be considered.

Political Status: Political status also influences the actors' values, power positions, and strategic choices. Specifically the governmental value and strategic choices are influenced directly by political status, although they are also influenced by the other environmental factors. The major variables that define political status in industrial relations are the degree of democratization, political stability, and the platform of the party in power or the ruler's values. The political status is an important variable in analyzing industrial relations in a developing country that is under absolute power or has an unstable political status.

Economic Status: The last important element of the general environment is economic status. This represents both the quantity and the quality of the economy of a country. The former is the level of economic growth as reflected in a nation's economic activities, and the latter is the stage of economic development as reflected in the industrial structure. The stages of economic development are defined as follows: the beginning stage of industrialization, the labor intensive industry stage, the capital intensive industry stage, the technical intensive industry stage, and the knowledge intensive industry stage. When an economic status is in an advanced stage and is in long term stagnation, the actors tend to have conservative values and the workers' power positions become weaker.

2.2.2 Competitive Environmental Factors

The competitive environment includes product market, technology, labor market, capital market, and ownership & scale. In this model, however, the capital market is not discussed.

Product Market: There are two reasons why the product market is a very important factor of the competitive environment. One reason derives from the characteristics of the goods manufactured at an enterprise. The actors should establish PDR systems compatible with the goods that they make, because different

goods need different machines, different facilities, and different technologies in the manufacturing processes. These encourage actors to make different strategic choices for PDR systems.

The other reason derives from the firm's competitive position in the product market. It is measured by the degree of control over price and quality. Both the goods' characteristics and the competitive position of an enterprise determine the scope and the structure of the market in which the firm's goods are traded. The market scope can be classified into the local market, nation-wide market, and world-wide market according to the geographical scope of competition. The market structure is determined by the number of competitors, the degree of entry barriers, the standardization of products, and the availability of substitute products, as most textbooks on microeconomics or industrial organization indicate.

The competitive position of an organization affects the range of the actors' strategic choices as well as the actors' value. If an enterprise has the position of price maker in the domestic market, the actors realize a wide range of strategic choices. In contrast, if an enterprise is a price taker, the actors' strategic choices might be very narrow.

Technology: Another competitive environment is technology. Technology both affects and is influenced by industrial relations. The former is called external technology, and the latter internal technology. The former is developed outside a unit and the latter is developed inside a unit. In the model, therefore, the external technology is an exogenous variable, and the internal technology is an endogenous variable as the outcome of the interaction of the PDR systems in the preceding term (see Figure 2). But both of them, as an environmental factor at time t (see Figure 2&3), heavily influence job contents and structures, as well as the workers' characteristics which are demanded by the job. Therefore, to maximize the positive effects of the interactions of PDR systems, actors should make strategic choices regarding technology. The higher the level of the external technology and the more rapid the speed of technological change, the less power the workers have.

Labor Market: The labor market also has a significant effect upon the actors' values, power positions, and strategic choices in terms of both the quantity and quality of the labor forces. On the quantitative scale, while a labor shortage strengthens the power of the workers and makes their strategic choices easier, labor surplus weakens their power and limits their strategic choices. That is, employers gain power in a loose labor market, and workers gain power in a tighter labor market.

The diversity of labor force characteristics also affects actors' values and power positions. The characteristics of the labor force are heterogeneous not only by nature, but also as developed during a worker's lifetime. We call the former the native (inborn) characteristics and the latter the posterior (acquired) characteristics (Lee 1984). The heterogeneity of acquired characteristics is formed by edu-

cation, training, and experience within the family, during schooling, and in society, which affects the workers' way of thinking as well as the quality of the labor force. Workers may have different values according to their acquired characteristics as well as their inborn characteristics. If workers have different values, it is difficult for them to establish a sense of union. Therefore, at a workplace with a heterogeneous labor force, workers will have difficulty in forming a strong union, and will be weak in collective bargaining. The labor market within a country also might be stratified or segmented by the actors' strategic choices for employment system using signals such as inborn and/or acquired characteristics. Workers belonging to different strata have different values and different power positions, because workers' characteristics and market status vary according to the strata. The qualities of the labor force vary within and between countries. Actors should make different strategic choices for PDR systems in the high quality labor market from the low quality labor market.

In dealing with industrial relations, the quality of the labor force also should be considered relative to the workers' potential mental faculties as well as to unrevealed and revealed abilities in both academic circles and practitioner circles. Many actors tend to consider only the revealed abilities or not much more than unrevealed abilities using proxy variables such as gender or education level. A mind stimulation system should be established that will convert unrevealed abilities into revealed abilities as well as an ability developing system that will reveal the potential mental faculties.

Ownership and Scale: Production in a market economy takes place in a wide variety of business organizations from the tiniest individual proprietorships to the giant corporations that dominate economic life in a capitalist economy. Small businesses have little discretionary power in making strategic choices in many respects. It is very difficult for them to develop strategies for the competitive environment. Workers of small firms also have difficulty creating strategies to improve wages and working conditions. The largest corporations and their workers have the discretionary power to make strategic choices in many facets of competitive environmental factors and PDR systems.

2.3 Actors' Strategic Choices and Contexts of PDR systems

Actors make strategic choices on the basis of their values, considering their power position and environmental factors. As already discussed, actors adopt two kinds of strategies that affect industrial relations: one is to strengthen their power position, and the other is to alter the contents of the PDR systems. Actors cannot abolish the PDR systems themselves or change them into other systems. They should change the contents of the PDR systems, however, to be compatible with ever-changing environmental factors. Therefore, we need to identify the contents of PDR systems.

2.3.1 Production System

We define the production system in industrial relations as an established orderly way in which workers produce goods and services, and determine the quality of products. This definition is quite different from the factor perspective such as a management of factors of production or a least-cost factor combination. While the concept of labor as a cost is more meaningful in the factor perspective, the concept of a worker is stressed in this model. This means that a worker is perceived as a subject of production that has an intangible asset with a mind and ability, whereas labor as a cost is perceived as a factor of production that is equivalent to capital and land.

The production system consists of three subsystems: the humanware system, the software system and the hardware system. Human resources include intangible assets such as a mind, a creative capacity, and a set of abilities that can be developed. Therefore, human resources can be developed as a creative resource by the "humanware system."¹ Creative humanware is generated by a good combination of a mind system and an ability developing system.

Humanware system: The humanware system consists of an employment system, a mind system and an ability developing system. The employment system contains the issues of hiring, staffing, promotion, personnel evaluation, job security, quit and retirement. The mind system consists of a learning mind, a creative mind and a cooperative mind, which are stimulated by the contents of the other subsystems of the production system as well as the distribution and the rule-making systems.

The ability developing system is an established orderly way to develop workers' ability continuously. It consists of a workers' academic base, an education and training system and an adaptability system. The academic base demonstrates the ability level of reading, writing, speaking, listening, computing and understanding. The screening devices of the employment system determine the academic level and the latent ability of employees. The education and training systems consist of OJT and Off-JT. The adaptability system includes job rotation and career development systems.

The best ability developing system comes from obtaining a good match among the workers' academic base, education and training system, and adaptability system. Although a company may have a good hiring system for a high quality labor force, it cannot establish a creative humanware system without a good ability developing system and the adaptability system suitable to the workers' academic base. Therefore, an efficient OJT system needs to establish a job rotation system and a career development system capable of maximizing the os-

¹ Shimada and MacDuffie(1986) labeled "humanware" as an interactive relationship between hardware and human resources. This definition is very similar to our definition of production software. This paper defines "humanware" as a system to convert human resources into creative resources.

motoc principle.⁵⁾ The other conditions for an efficient OJT are the workers' learning minds and a skill diffusing climate; the former belongs to the mind stimulation system, and the latter depends upon the distribution system. The Off-JT helps workers to share ideologies and understand the general skill or knowledge that is related to their jobs.

Software System: The software system consists of "the production software system" and the computer software system. The "production software system" refers to the method of matching humanware with computer software and hardware. It is work organization such as patterns of organization in firms, and work practices such as Taylor's scientific management, just-in-time, self-managing work teams, QC circles, suggestion system, and other continuous improvement programs. As examples of production software combined with computer software, there are CAD/CAM, ALC, CIM, and so on.

Hardware System: The hardware system refers to production facilities such as tools, unit machines, flexible machines, conveyor belts, and robots, and so on.

Interaction of Production Subsystems: In the production system, a humanware system interacts with a software system and a hardware system. The most important point is that only humanware can create itself as well as software and hardware systems, whereas the other production subsystems are not creative. Hardware (machine) just does what it is made to do and no more. The software system that controls the hardware system also neither have a flash idea nor find a better way even though software is very diverse for a given production system. The other important thing is that the type of production system depends on the combinations of these three subsystems. Examples are craft production, mass production, lean production, and flexible production systems.

2.3.2 Distribution System

We define the distribution system in industrial relations as an established orderly way of distributing economic shares and non-economic benefits to participants in production activities. Therefore, the distribution system in industrial relations consists of the economic distribution system and the non-economic distribution system. Economic distribution affects individual efforts, and non-economic distribution stimulates community consciousness.

Production activities entail human behavior as affected by the technical combination of land, labor and capital to make goods and services under uncertainty. The "value added" by production activities is distributed into rent, interest, wages, and profit to landlords, capitalists, workers and entrepreneurs, respectively. As rent and interest are determined by a market principle as a kind of factor price, wage is determined by the actors' strategic choices and institutional factors, and profit is residual. This means that the wage determination mechanism is at the

⁵ About the osmotic principle of OJT, see Lee, Hyo Soo(1994, pp. 106-118).

heart of economic distribution in industrial relations. The wage bill in a unit is determined by the actors' power balances and their strategic choices. The wage level of an individual worker is determined by the wage system, which is the result of the actors' strategic choices, considering the workers' characteristics and the job contents. The economic distribution system also contains profit (or gains) sharing and employees' stock ownership that is based on the workers' participation. The type and the fairness of the economic distribution system have a strong influence on the mind system.

A wide variety of non-economic benefits that influence workers' effort and productivity are also distributed at the workplace. They are political distribution and social distribution. The former is empowerment, and the latter is investment in working conditions. Investments in working conditions determine the levels of physical and social conditions of the workplace. The physical conditions are determined by the level of heating, lighting, ventilation, cleanliness, the quantity and type of safety devices on dangerous machines, and health hazards such as dust, fumes, toxic gases. The social conditions are determined by the supervisors' treatment of the workers and the solving of other human relations problems in the workplace. Physical conditions affect the workers' physical health and social conditions affect the workers' mental health.

Non-economic distribution is done in a different dimension and in accordance to different principles than is economic distribution. In an economic distribution, all economic shares are directly distributed to all participants in production activities and are subsequently owned by them. Non-economic distribution affects the workers only in the workplace, and the invested physical goods for working conditions are not owned by the workers. Workers enjoy only the intangible benefits from physical goods invested in working conditions. That is, if a firm provides safety devices for dangerous machines, workers can protect themselves better.

If other things are equal, the increase of the physical capital investment to improve working conditions may decrease the relative shares of wages and/or profits. However, an increase in non-economic distributions to improve working conditions actually yields an increase in productivity as well as costs. Of course, the effect of non-economic distribution on productivity is hard to evaluate because it affects productivity indirectly through the mind system. Yet the non-economic distribution can make a large difference in productivity, because it has a strong influence on the workers' minds on a daily basis.

2.3.3 Rule-Making System

A third interrelated component of PDR systems in industrial relations is the rule-making system which enacts and administers the rules that govern a production system and a distribution system. Therefore, the rule-making system consists of subsystems such as the rule-making process system and the rule admini-

stration system.

The rule-making process system refers to the process of making rules and the organizational level where the rules are enacted or put into effect. The rules in industrial relations are made at the company level, the industrial level, and the national level. The rules at the national level are labor law, government policies, and collective agreements between the nation-wide manager association and the nation-wide trade union. The rules at the industrial level are made by collective bargaining between an industrial union and an industrial management association. These two kinds of rules at the macro level have an influence directly or indirectly on an individual unit's rules.

The rules at the company level are made by management only, or practices based on organizational culture, or collective bargaining between management and a trade union, or workers' participation in management. The types and degree of employees' involvement are very diverse. The issues and the processes in which workers participate, and the effects of the workers' voice on the issues vary from company to company. The two major factors in the rule-making process which generate trust between workers and management, are the degree of democracy in the rule-making process and the fairness of the rules. These factors affect the rule administration system as well as the mind system.

The last subsystem of the rule-making system is the rule administration system. There are rules that are written or unwritten. Regardless of the type of rule, the most important things in rule administration are information sharing and good communication, grievance procedures, arbitration, the justice of the rule execution, discipline and discharge.

2.4 Actors' Conflict and Cooperation

It was noted earlier that the functioning of individual components of the PDR systems depends on the level of cooperation among actors as well as on the actors' strategic choices. Hyo Soo Lee(1996) proposed a spectrum of actors' cooperation for PDR systems; from severe conflict to spontaneous cooperation. The spectrum of conflict or cooperation depends on the actors' value and power positions, and the level of worker participation in PDR systems. Conflict comes from the actors' negative values for industrial relations, the change of the actors' power positions, and limitation of worker participation in PDR systems. Spontaneous cooperation comes from the actors' positive values for industrial relations, partnership based on power balance, and trust with workers' participation in PDR systems, which leads to mutual gains.

On a different level, the actors' cooperation also is under the influence of the performance of the preceding terms. That is, performances at time t will influence actors' cooperation level at time $t + 1$. It may be difficult to get spontaneous cooperation for process innovation or product innovation at time $t + 1$, given an

unfair and discontented distribution at time t .

2.5 The Interaction of PDR Systems and the Performances of Industrial Relations

In Figure 2, the software and hardware systems heavily influence working conditions (the non-economic distribution system), a subsystem of the distribution system. The distribution and rule-making systems can have an enormous impact on the production system through the mind system. Workers with creative minds might have the best ideas about improving software system and matching production subsystems well, and the ideas could be realized by the cooperation of able workers. When the mind system and the ability developing system operate at a high level, the hardware and software systems are used efficiently and are improved.

The level of the mind system is determined by the fairness of the distribution and rule-making systems, and the actors' satisfaction with the PDR systems. The fairness is justified by the principle of common sentiment which is established by the socio-cultural climate. Although human desire is unlimited, the level of workers' satisfaction can be adjusted by the mutual understanding among the actors and the actors' understanding of the PDR systems. The level of common sentiment and mutual understanding is determined by the level of workers' participation and the democratic decision-making mechanism in the community.

The production system determines the quality of goods and services, production efficiency, and the flexibility of production to customize. The quality of goods and services is determined by the levels of three production sub-systems and their interaction. Production efficiency is determined by the joint efforts of the community members rather than the least cost factor combination.

The production flexibility should be differentiated from the employment flexibility. The production flexibility is secured by software adjustment and humanware adjustment. The software adjustment is done by just-in-time production or a mixed flow production or an organizational adjustment such as team-based organization. The humanware adjustment consists of quality adjustments and quantity adjustments. The former is realized through skill formation, job arrangement and job rotation. The latter has internal adjustments and external adjustments. Internal adjustments adjust the amount of labor input within a firm, which includes overtime adjustments, temporary workers' adjustments and work-shift adjustments. The external adjustment (or employment adjustment) refers to adjusting the amount of employment between a firm and a labor market, of which the method is downsizing by means of layoffs or discharges.

The trust among the actors might be lost if a company adjusts the amount of employment too readily whenever it has difficult times. Spontaneous cooperation does not come without trust. Therefore, companies should try to maximize production flexibility and avoid employment adjustment.

A good production system makes incremental innovations as well as internal technological developments in the workplace. Efficient production requires a creative humanware system and good production software system as well as a conventional least cost factor combination. Creative humanware can continuously adopt and improve hardware and software, which leads to product and process innovation. As a result, the production function will be shifted upward.

In particular, flexible production systems encourage workers to use their minds and creative talents, and provide workers with opportunities to learn continuously on the job through job rotation and other flexible work system arrangements. Productivity and other measures of performance are therefore influenced by the level of cooperation among the actors within PDR systems and by the quality of workers' minds and abilities.

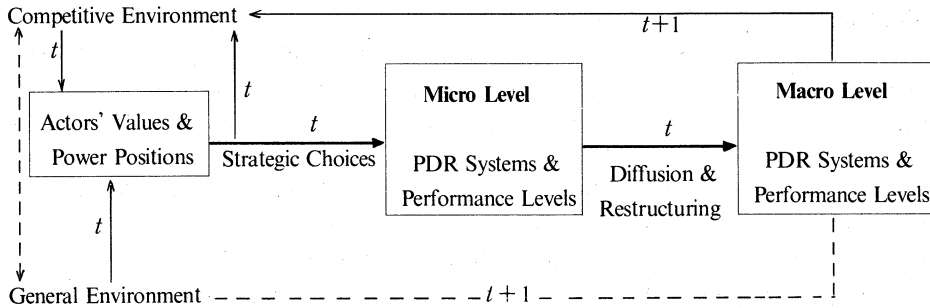
The workers' quality of life in the industrialized society is mainly influenced by both economic and non-economic distribution systems. Although the level of distribution is determined by the actors' strategic choices, it is basically constrained in the productivity by the indivisible principle.

In conclusion, the PDR systems and their interactions determine the level of such outcomes of industrial relations as the quality of goods and services, production efficiency, production flexibility, innovation, and the workers' quality of life.

IV. MACRO-MODEL AND DYNAMICS OF PDR SYSTEMS

Figure 3 diagrams the macro-model and the dynamics of PDR systems. We have already discussed industrial relations on a firm level. We now need to develop a macro-model of industrial relations at the industrial level or national level. A macro-model in industrial relations will be developed by both the aggregation method and the extraction method which draws out the common features of PDR systems from all relevant units. The common features of PDR systems in an industry are molded by the diffusion of strategic choices among firms. The contents of PDR systems are diffused across companies and industries by competition, cooperation between contractors and subcontractors, the structures of conglomerates, and trade union strategies. The diffusion and restructuring determine the performance levels of PDR systems at the macro level: the quality of goods and services, production efficiency, flexibility, innovation, and workers' satisfaction or quality of life.

The performances of PDR systems at the macro-level alter the characteristics of goods and services, the product market structure, the demand structure of the labor market, and external technology. This means that the PDR systems at period t change the competitive environmental factors at period $t + 1$. The changes of competitive environmental factors affect general environmental factors through the changes in quality of life and the consciousness of people. These changes in

[Figure 3] Macro Model and Dynamics of PDR Systems

the general environment and the competitive environment from the t period to the $t+1$ period induce actors to make new strategic choices that will change the contents of the PDR systems in the $t+1$ period. This gives the PDR framework a dynamic component and allows us to examine how current behavior is influenced by prior actions and choices.

V. DISCUSSIONS AND CONCLUSIONS

This model demonstrates that industrial relations determine not only the quality of workers' lives but also the national and company competitiveness, analyzing industrial relations as a synthesis of production, distribution and rule-making systems. This perspective is quite different from traditional passive perspectives that viewed industrial relations as either in conflict or industrial peace. This model basically rests on community perspectives rather than production factor perspectives. Therefore, the best way to achieve competitiveness is realized in the actors' spontaneous cooperation for PDR systems rather than the best combination of the cheapest factors of production. Especially in the quality competition market, spontaneous cooperation on each actor's autonomy is the best strategic choice for trade unions as well as management. Spontaneous cooperation is given not by a sweetheart union such as an induced and forced union but by a cooperative autonomous union.

This model focuses on the production system with particular emphasis on the humanware system that converts human resources into creative resources. The model also stresses that the distribution and rule-making systems are synthesized with the production system as well as having an enormous effect on it through the mind system. This means that we can continue to improve productivity and the workers' quality of life if we succeed in structuring good PDR systems in industrial relations. Therefore, a company should opt for dynamic competition using creative comparative advantages rather than static competition using endow-

ment comparative advantage to achieve mutual gains.

We can use this model in both the analysis (science-building) and diagnosis (problem-solving) of industrial relations. Such a framework will be useful for a comparative analysis between industries or countries, and for a dynamic analysis over time, as well as an analysis of industrial relations at a company level. Further, it helps us to identify the root causes of weak competitiveness and the problems of industrial relations. If some problems are found in the quality of goods and services, or production efficiency or production flexibility, we should examine the production subsystems of such as humanware, software, and hardware systems. Next, we should examine the distribution system or the rule-making system. If we still cannot identify the cause, we should examine the interaction effects of PDR systems. Finally, we need to examine whether the strategic choices are compatible with environmental factors.

This model covers nonunion workplaces as well as unionized settings by embracing collective bargaining as a kind of the rule-making process system. It also covers human resource management and traditional industrial relations issues by centering humanware systems on actors' strategic choices in PDR systems.

Through this model, it is proposed that the heart of industrial relations lies in the actors' strategic choices for PDR systems and the interactions of these systems. It is important to investigate the contexts of environmental factors and PDR systems and to examine the effects of environmental factors on those strategic choices. This model lays the groundwork for the construction of middle range industrial relations theories. The theory requires further empirical studies to be conducted on the micro and macro levels.

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