UNCERTAINTY, HIERARCHY AND VERTICAL INTEGRATION*

*Hans G. NUTZINGER***

"It is one of the defects of our civilization that mechanism has not been involved to enable human ability to hypothecate its productive power in procuring resources to make it effective under its own direction and responsibility."

Frank Knight (1921, 350 f.)

I. INTRODUCTION

In the past twenty years considerable progress has been achieved in the framework of general equilibrium theory. One of the less satisfactory points in this framework remained, however, the treatment of the firm as a social institution for the production of commodities. Above all, there are three assumptions which give rise to criticism and also to remarkable attempts, such as Oliver Williamson's (1975) "new institutional economics", to approach the organization of the enterprise from a different viewpoint. The three major points are:

- (1) Traditional equilibrium analysis describes firms in terms of their production possibilities set, i.e., by their state of "knowledge about the possibilities of transforming commodities" (Arrow and Hahn, 1971, 53). Virtually nothing is said about the internal organization of the firm, nor is there any explanation of how an individual firm achieves a certain state of knowledge about the production possibilities.[1])

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** Gesamthochschule Kassel and International Institute of Management, Berlin.

[1]) According to the above definition of production possibilities, the internal organization is simply included into the "production possibility set".

(2) "The entire production side of the economy is assumed to be composed of a finite number of (potential or actual) firms". (Ibid., 72) It would be certainly much more realistic to consider both the number and the production possibilities of the enterprises, not to be given *a priori* as the starting point of the economic process but as its *outcome*.[2])

(3) Finally, the treatment of entrepreneurship in the firm is far from being satisfactory. If it is specified as a marketable input, as in McKenzie (1959), then it is reasonable to assume constant returns to scale[3]) for all commodities, which leads to an equilibrium with zero profits (after deducting the market payment for entrepreneurship); the size of the firm is then limited by the restrictions on the firm's specific entrepreneurial input. On the other side, in the Arrow-Debreu model, which does not include entrepreneurship in the list of marketable goods, there is no way to discriminate profits according to whether they are a compensation for (unspecified) entrepreneurial inputs or pure economic rents, since the firm's owners receive the profits without necessarily being entrepreneurs.[4])

[2]) Of course, it is much easier here to criticize general competitive analysis than to provide an alternative coherent theory. Nor would it be correct to blame general equilibrium economists for having overlooked the problem at hand. Arrow and Hahn, in their outstanding monograph, recognize that the traditional model "with production taking place in firms separate from households and profits then being redistributed to the firm's owners, is inappropriate... [and] that an adequate theory of bargaining should explain the formation of firms, not merely take them for granted". (1971, 198) In their approach, for instance, the production possibility set is associated with each possible coalition of households. Another related attempt has been Sondermann's (1974) model of a coalition production economy with increasing returns to coalition, which has been further elaborated by Ichiishi's model of enterprise formation unifying the coalition production approach and the Vanek (1970) — Drèze (1974) model of labour-managed market economy. Unfortunately, in our view, all these attempts neglect an essential feature of modern industrial production, namely that *consumers* entering the firm *as workers* face a certain organizational structure which they can hardly influence by their consumption decisions.

[3]) The usual explanation for diminishing returns, such as Marshall's (1920) argument that the control of the production processes will get more difficult as the size of the firm becomes larger, means essentially nothing but an *ex post* specification of inputs.

[4]) Cf. The characterization of this situation by Arrow (1971, §1)

Moreover, one would have to explain why entrepreneurship is not a marketable input.[5,6])

If on considers entrepreneurship as a specified input which can be bought by each coalition of households on the marketplace, then it becomes difficult to understand the internal organization of the enterprise with its complicated network of contractual[7]) and informal relationships. As a consequence, it would hardly be possible to identify organizational differences between "capitalist firms", where the possessors of entrepreneurial knowledge hire the workers, and "labour-managed enterprises", where the workers themselves are buying the needed entrepreneurial input on the market. One would be close to the situation of perfect competition characterized by Samuelson (1966, 351), where it does not really matter who hires whom.

On the other hand, the opposite view, which considers the entrepreneur as the "ultimate hiring party", i. e., the central party which is hiring all other inputs without being hired itself by another party, is not completely satisfactory. Certainly, as a first approximation, one can relate the entrepreneurial discretion to the specific kinds of contracts which are entered into by this central agent of production with the owners of labour power — namely, wage-contracts that imply a unilateral right to direct the complete activity of the worker within certain limits[8]) —, but then it becomes very difficult to explain subordination relationships within those kinds of firms which are not based on *wage-labour*. If one considers existing productive organizations under different legal and social conditions, then one observes *some degree* of hierarchy in the sense of an unequal distribution of decision-making power and of — at least factual — subordination relationships in all

[5]) This explanation is attempted by FitzRoy (1975), in a hitherto unpublished paper which also criticizes Sondermann's (1974) approach. In a static environment *without uncertainty*, it would be difficult to maintain the assumption of non-marketability, because in this case a kind of production *arbitrage* — namely, markets with the property of getting "ultimate hiring party" — would be likely to evolve which in turn would reduce the pure entrepreneurial profit to zero level. This fact has been used by Ellerman (1974) to establish the impossibility of general equilibrium with positive profits.

[6]) Further criticism could be raised against the treatment of wage labour in general equilibrium theory which abstracts from the fact that not labour, but rather unspecified labour power, is marketed, the concrete use of which is only specified later on within the firm by the entrepreneur (Gintis, 1950). That production is insufficiently dealt with in general equilibrium analysis is very clearly illustrated by Rader's (1964) proof of the equivalence between a pure exchange economy and an equilibrium model including production — a result which Rader gets by introducing so-called "induced utility functions" representing both production and consumption decisions.

[7]) For a comprehensive analysis of different contracts which enter the organization of the firm, and of their connection with different degrees of uncertainty and mobility of various factory owners, see FitzRoy and Mueller, 1976.

[8]) This viewpoint is shared by very different authors, such as Marx (1867) and Coase (1937), as discussed by Gintis (1975) and Nutzinger (1976).

existing firms, even if no formal authority relationship[9]) exists Tannenbaum's (1974, 1975) quantitative measurement of hierarchy in different countries[10]) indicated only differences in the extent but not in the existence of subordination relationships. Even in countries that have introduced nation-wide labour-management, such as Yugoslavia, one notices some sort of control and coordination of the production process by a differentiated subset of the working collective, the "management of the firm". This fact suggests a search for "functional" reasons for hierarchy which do not rest on the institutional framework or the concrete contractual structure of the enterprise, but which results from some technological requirements of production. As we will see in Section III, it is not possible to delineate clearly between the institutional and functional determinants of hierarchy, even though this attempt gives some heuristic insights into the internal structure of the enterprise. The main hypothesis of the present paper is that both hierarchy and vertical integration are based to a considerable extent on the existence of uncertainty and especially on incomplete information at each stage of the decision-making process.

II. HIERARCHY AND VERTICAL INTEGRATION: PRELIMINARY CONCEPTUAL CLARIFICATION

Oliver Williamson, in his pioneering studies on vertical integration and hierarchy (1967, 1971, 1975a, 1975b, 1976), uses both these concepts more or less synonymously without defining them very precisely. Less problematic in this context is the concept of vertical integration which Williamson sees as the replacement of (intermediate) product markets through intra-firm organization (1971, 122). Apparently, he assumes that the non-market organization within the firm will be necessarily hierarchical in the sense that it leads to an unequal distribution of decision-making power and to formal (or at least informal) relations of subordination.[11]) Certainly, this viewpoint very often has its empirical justification; but at least theoretically, one can think of cases where within an enterprise all decision are made in a "democratic"[12]) way, and are made by all members jointly, so that vertical integration does not yet imply hierarchy on the conceptual level.

On the other hand, the queston of decentralization of decision-making through markets or market-oriented relationships is closely connected in reality with the problem of hierarchy; at least, in large, non-transparent organizations, effectively democratic decision-making is hardly possible.[13]) Precisely on these grounds, further decentralization has been effected within the work-managed enterprises by introducing more-or-less autonomous "work units" (GOVA). In this model, only decisions which concern several work units or the whole enterprise are made by enterprise committees or by bargaining among the units. Apparently, this attempt at a decentralization of decision-making *within* the firm leads to a re-introduction of market-like relationships, for instance, through accounting prices among the units that are bargained over for some period in advance by the different departments of the firm.[14])

Finally, the existence of a formal market relationship among unequal parties, such as big corporations and small suppliers, is only a legal warrant for the absence of hierarchy, since a more formal right to direct and subordinate is missing and market power is used instead. Not in its legal, but in its economic consequences, this situation comes very close to the hierarchy relationship if, for instance, the supplier has directed his own production completely to the needs of the big customer; the factual dependence upon the big corporation then may come quite close to the case of vertical integration of the supplier.[15])

In spite of these modifications, Williamson's more-or-less identification of internal organization and hierarchy and his idealized opposition of markets and hierarchies is probably a good empirical approximation. Even the Yugoslav worker-managed enterprise is not only ruled by the democratic representation of the working collective in the decision-making committees,[16]) but also by the unavoidable delegation of competence to individuals and by a differentiated job-structure which gives the executives of the respective functions a different position in the daily working process.[17]) And on the other hand, within a market economy every attempt to decentralize decision-making within big enterprises necessarily leads to the introduction of market-oriented elements of coordination between the different enterprise departments, which again reveals the close connection between decentralization and market coordination. This empirical correlation has its the-

[9]) A simplified formalization of the authority relationship between "Boss" (B) and "Worker" (W), implied in the wage contract, is provided by Herbert A. Simon (1957, 184): "We will say that B exercises *authority* over W if W permits B to select x. That is, W accepts authority when his behaviour is determined by B's decision. In general, W will accept authority only if x_a, the x chosen by B, is restricted to some subset (W's 'area of acceptance') of all the possible values."

[10]) Tannenbaum (1974, 1975) investigates especially Italy, Israel, Yugoslavia and the USA.

[11]) Yet Williamson (1976) considers the "peer-group" organization as non-hierarchical, even though no market relationships are implied.

[12]) For the problems of a precise and operational definition of „democracy", see, for instance, Robert Dahl (1975), who proposes replacing it by the more cautious term "polyarchy".

[13]) See, for example, Dahl (1975) with further references, and the discussion of the problem in the context of public administration by Nutzinger (1976c 1978).

[14]) For a normative description of this reform, see e. g. Gorupić (1978). For a critical evaluation of the practical consequences with further references see Soergel (1978).

[15]) Another example of this dependence is the putting-out system which we shall discuss in Section V.

[16]) According to empirical investigations (Obradović, 1972; Bertsch, 1976; Soergel, 1978), even within these democratically-elected institutions, the actual influence among the different subgroups is unequally distributed. Before drawing overly extensive conclusions from these investigations, however, one has to ask to what extent informal relationships and the different tasks of various subgroups (such as the professional management and the low-qualified workers) are taken into account.

[17]) For this, see Section III below.

oretical substantiation: as has been emphasized above all by Frank Knight (1921), the internal organization of the firm, and even its mere existence as a unit separate from the market, has to be understood as a consequence of uncertainty:

> "With uncertainty entirely absent, every individual being in possession of perfect knowledge of the situation, there would be no occasion for anything of the nature of responsible management or control of productive activity. Even marketing operations in any realistic sense would not be found." (1921, 268)

The existence of uncertainty, however, shifts the relative weight of different activities such that the decision-making about the activities to be performed, i. e., the reaction to unforeseen situation, becomes more important than the execution of the activities itself. Hence, "the internal organization of the productive groups is no longer a matter of indifference or a mechanical detail". (1921, 268)

Since Knight is concerned with establishing the existence and efficiency of the capitalist entrepreneur, he does not give much attention to the more general problem of hierarchy within the firm. His uncertainty viewpoint, however, can be used to explain hierarchical organizational structures under different social conditions. The general connection between hierarchy and uncertainty can be illustrated easily by comparing the behaviour of organizations in known or *ex ante* precisely (and correctly)specified situations with the reactions and adaptations which become necessary in novel, unforeseen situations.

The corresponding scenario has been set up in a very illustrative manner by Jay R. Galbraith (1973, Ch.. 2): In a world without uncertainty, production can be arranged horizontally by connecting the different work-steps, which implies a functional division of labour among the different groups within the enterprise. This "mechanistic model" leads to the following simplified graph:

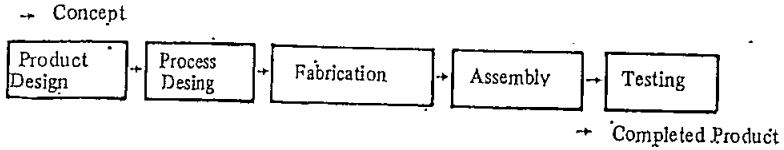

Figure 1:
Horizontal Work–Flow Across a Functional Division of Labour[18])

The coordination of the single related work-steps in this mechanistic model is done by an *ex ante* specification of all relevant work situations and of the activities or adaptations which have to be carried out by the respective members of the organization. In this simple scenario,

[18]) See Galbraith (1973, 9).

there is not yet a distinction according to whether the rules or programmes specifying the expected behaviour result from a democratic decision-making process, or whether they are determined "from the top" by an enterprise management.[19])

This simple mechanistic model, however, fails whenever the organization faces unforeseen situations for which no rules or programmes are predetermined: now an adequate reaction must be developed — by no means a trivial task, as all work-steps concerned have to be taken into account. The problem of information collecting and processing is no longer a solitary starting task, but rather an ongoing process which becomes not only much more difficult, but also far more important for the organization.[20]) To handle this task, new "managerial roles" are created whose occupants have to collect the information and to infer from it the decisions which may be necessary for dealing with the uncertainty problem. In this way, a hierarchical organization structure of approximately the following type evolves:[21])

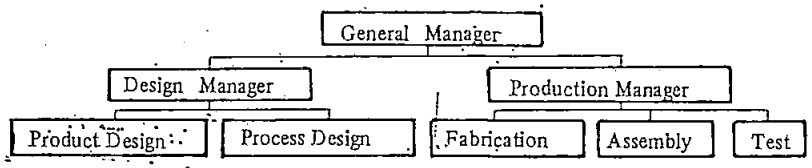

FIGURE 2:
Hierarchical Organization Structure

Now, as unanticipated events arise, the specified behavioural rule is replaced by the more general "meta-rule", implying that this problem has to be referred "upward", according to the extent of the work-steps concerned, to the manager or to the general manager, who has the information (and has the right) to make a new decision. Here, the factual behaviour of the executing members of the firm are based partly on the *ex ante* specification of the different tasks and on the decisions made by the management. The hierarchy of authority is not (yet) based on a general contractual subordination (such as in the case of an idealized wage contract), but it is employed on an exception basis in order to deal with those unforeseen situations for which no specified rules are available. It is important to note that here hierarchy does not *replace* the application of specified rules, but that it is assumed to *complement* the rules wherever necessary.

[19]) In this situation without uncertainty, it becomes difficult to substantiate why this kind of entrepreneurial input should not be marketable, which suggests theoretical models of general equilibrium such as McKenzie's (1959) or Ellerman's (1974) with zero profits.

[20]) In a similar way, Alchian and Demsetz consider the enterprise as an institution "for collecting, collating and selling input information" (1972, 793), but they consider it to be some kind of a specialized market.

[21]) Cf. Galbraith (1973, 11).

The processing capacity of this hierarchy, however, is limited: as the extent of uncertainty grows, the exception becomes the rule, and the higher levels of the hierarchy are overcharged with decision-making tasks. This again makes it necessary to decentralize part of the decisions.[22]) This limited capacity of the top of an organization to handle decision-making tasks casts some doubt on Frank Knight's (1921, Ch. 9) simplistic splitting of activities into the decision-making function of the entrepreneur and the executive function of the labourer. Even more problematical becomes his social-Darwinist view of a development towards a strict centralization or "cephalization"[23]) of decision-making and control activities:

> „Centralization of this deciding and controlling function is imperative, a process of 'cephallization', such as has taken place in the evolution of organic life, is inevitable, and for the same reasons as in the case of biological evolution." (Knight, 1921, 168f.)

This oversimplified Knightian view of the classical capitalist enterprise that is also apparent in many other details of his analysis[24]) certainly is misleading insofar as it tends to describe this type of enterprise as the most efficient and, in a way, natural[25]) method for dealing with uncertainty problems. Similarly unsatisfactory is Knight's quasi-biological assignment of entrepreneurship to the subjective degree of risk-taking, according to which risk-prone individuals normally become entrepreneurs; risk-averters, on the other hand, become workers.[26]) Nevertheless, Knight's general suggestion that the internal structure of the firm has to be explained on the basis of imperfect knowledge of the relevant data both in the present and in the future remains very important. Using this viewpoint, one can moreover make clear the biases in Knight's view, as we have just indicated, and as we will show later on in more detail.[27])

[22]) More on this is said in Sections V and VI.

[23]) This term formed by Knight indicates the evolution of the top of the organization.

[24]) This is especially apparent in Knight's description of the wage contract as a unilateral insurance contract between the risk-averse worker and the risk-prone entrepreneur, or in his neglect of structural imperfections in the capital markets in borrowing on human capital. For this, see also Section V below.

[25]) Some economists even tend to use both these concepts synonymously when they link efficiency to the problem of the survival of organizations; cf. for example Alchian and Allen (1977, 220), who describe the entrepreneur as the effective, superior proprietor who survives.

[26]) Cf. Knight's description of the consequences of uncertainty on the selection of individuals and the specialization of functions, especially his fourth tendency relating entrepreneurship to subjective confidence in judgments and dispositions (1921, 270).

[27]) See Section V below.

III. ELEMENTS OF HIERARCHY IN THE JOB-STRUCTURE

So far, we have related the introduction of formal hierarchy to the problem of uncertainty by emphasizing the necessity of decision-making in unforeseen situations. But also, in more-or-less routinized processes one observes elements of hierarchy in the sense of unequal distribution of decision-making power and, very often, also of formal hierarchy, which are related to the functional division of labour. First, it is a well-known fact that better-educated and qualified people tend to have more responsibility and more influence upon the way the processes are performed, and this happens largely independent of the formal organizational structure because of the specific kind of activities in which they are engaged.[28]) This unequal distribution of competence does not necessarily form a complete transitive hierarchy system, but it can be observed in fact that one member of the firm has a greater area of competence, in a sense to be qualitatively specified, than another one, without excluding situations in which the "less competent" member gives orders to the former.[29])

This phenomenon of an unequal job-specific distribution of competence in spite of institutionalized enterprise democracy has led to major problems both in the theory and in the practice of worker management. As has been emphasized especially by Adizes (1971, 1975), the professional management faces big difficulties in adequately defining its role within the Yugoslav system. The managers stress the idea of a functional competence for each member of the firm, without taking into account the fact that there are elements of hierarchy already inherent in the job structure as it has evolved historically.[30] This, to a

[28]) For instance, the qualified mechanic *must* tell the machinist which operations to perform, so that he can find the source of any failure of the respective machine; he *must* tell him where to place the spare part which the mechanic himself has to install. He *must* tell him how to operate the machine in the future in order to avoid expensive repairs This fact does not exclude the possibility that the lower-qualified machinist has some competence over the mechanic in other fields. But it must be expected that the mechanic's "area of competence" will be larger than the machinist's. In addition, one also observes a much greater factual influence of higher qualified people (of a degree attributable to higher competence), for example if one looks at the Yugoslav firm: there, they have more influence both by virtue of their overproportionate representation within the decision-making institutions, and of their stronger factory positions in these institutions and in the informal decision-making processes (Bertsch, 1976; Blumberg, 1968, 217—221; Obradović, 1972; Soergel, 1978). It is, however, much more difficult to interpret the empirical data than many authors seem to believe (cf. fn. 16 above).

[29]) As a quantitative measure of the relative degree of competence, one could think of the simple, unweighted probability that in a randomly-selected situation the individual A gives orders to the individual B, or the other way around. Of course, more sophisticated weights, for instance according to the importance of the situation or task, are imaginable.

[30]) For this reason, job-specified elements of hierarchy are not necessarily to be considered as "socially neutral", if one considers the historical development of technology and job structures as being determined in a social context. For this, see in a radical perspective Braverman (1974), Marglin (1974) and Stone (1975), and from a more traditional historical viewpoint with special emphasis on the role of managers in the process, Chandler (1977).

certain extent, unavoidable dilemma is well illustrated by the statement of a manager who apparently has been frustrated by lengthy and fruitless discussions with his workers:

> "I don't tell workers how to work on a machine because they know best how to do it. Why should they tell me what price to set for a product? They don't know the markets. They don't know the state of competition." (Adizes, 1971, 208).

Apparently this statement neglects the quite distinct importance of the two kinds of decisions, and especially the fact that the worker's decision on how to operate the machine is to a large extent already predetermined by the manager's decision about production. This illustrative example gives a clear hint of the fact that the enterprise canot simply be conceived as a political community of equal members.[31]) Certainly, on a conceptual level, one can reconcile the functional necessities of the daily production process and the ideal of political democracy by differentiating among distinct classes of decisions. This is done by Horvat (1973, 1975), who demands the *"separation of the value, interest sphere from the sphere of expertise; of political authority from professional authority; of decisions about policy from the field of administration"*. According to Horvat, the one-man-one-vote principle applies only to the first sphere, whereas "in the second, weights depend on the particular expertise which is sought for the given work... For the former, political polyarchy is relevant, for the latter hierarchy". (Ibid.) Unfortunately, Horvat associates this "expert hierarchy" with *execution* of decisions, which requires possession of special knowledge, *and not with decision-making itself.*[32]) In practice, these different spheres cannot be properly distinguished, and given the unequal distribution of information among the members of the firm, the managers are even free to a certain extent to *define* which decision is to be considered as a political or as an expert issue. This possibility, on the other hand, may lead to workers' distrust and to the managerial task of convincing the workers of the alternatives proposed by him, even if they do not have the qualifications necessary for substantiated decision-making. In short, there is no ready-made solution for this dilemma, and the reasonable managerial argument that everybody has his own area of competence simply neglects the factual hierarchical organization which evolves from the big differences in the degree and extent of this competence.

The differentiation between the more active, decision-oriented role of the management and the more passive role of the workers, who

[31]) But this conception is very frequent in the literature: see e. g., Vanek (1975, 34).

[32]) This confusion of concepts is simply due to the fact that Horvat confines decisions to the narrow class of basic "political" decisions, e. g., concerning distribution of income. Hence he considers the daily decision-making by managers and higher qualified employees as executions of the preceeding basic decisions — a rather artifical construction, as it does not easily fit into the way in which, according to empirical observations (cf. fns. 16 and 29 above), the members of the firm experience the daily work process.

exent rights of control and execute the approved decision, is yet consistent with the traditional model of democracy which is based on the division of labour between electors and elected, and on the struggle for votes among the competing elites,[33]) and some elements of functional hierarchy in the relationship between administration and parliaments can also be observed.[34])

But at least under Yugoslav conditions, there does not seem to be much intrafirm competition among managerial elites which would give workers very effective voting rights and the labour market shortage of qualified managers also limits the direct control possibilities through market competition. Even more significantly, the similarly important group of expents and technicians who exent in their special fields similar rights of direction, as does the formal enterprise management in business affairs, cannot be integrated into an unstructured democratic enterprise model in a straightforward manner.[35])

It seems to us that, at least in the short run, the conflicts between the democratic claim and the practical elements of hierarchy inherent in the production process and the associated job structure cannot be resolved. In contrast to political decisions which are already the output of democratic institutions, the production of commodities is subject to a large number of technical and market constraints that restrict the room for democratic decision-making. This is not to say that the conflict could be resolved by a movement in the opposite direction, towards a capitalist or an etatist firm. In this case, the tension between democracy and hierarchy would be replaced by a conflict between the then-existing formal authority relationships and the functional competence of the enterprise members, since in hierarchical firms, formal authority relationships also have to serve for the maintaining of the organizational power structure and hence cannot be completely derived from a "expent hierarchy" in the sense of Horvat (1975). We would then have a conflict between functional and formal competence.[36])

Again we argue that either of these types of conflict is based on the fact that the enterprise has to meet uncertainty problems which both enforce and limit participation by the members of the firm. In order to substantiate this proposition, we contrast in the next two sections two — not necessarily conflicting — approaches to explaining the evolution of productive organizations as reponses to uncertainty problems.

[33]) For a description and critique of this additional model of democracy with further references, see Pateman (1970) and Nutzinger (1976c, 1978).

[34]) Similar elements of functional hierarchy can also be observed in the relationship between public administration and the parliaments; see, e. g., Dahl (1975); the analogy between management and government is also drawn by Gudrun Lêman (1976, 64), who attributes to the workers more-or-less the voting rights of the traditional model of democracy.

[35]) For the empirical problems, see the overview by Lemân (1976, Chs. II and III).

[36]) For this see FitzRoy (1974), FitzRoy and Nutzinger (1975), and Nutzinger (1976a, Sec. I) with references.

IV. TRANSACTIONAL PROPERTIES OF DIFFERENT MODES OF PRODUCTION

Williamson (1975a) explains vertical integration basically as the replacement of market relations through internal organization, i. e., as a reaction to different cases of market failure. His *organizational failures framework* is intended to determine simultaneously the limits and the concrete forms of internal organization. This framework is characterized by four basic elements: (1) bounded rationality; (2) opportunism as "self-interest seeking with guile" (1975a, 26); (3) infomation impactedness in the sense of an unequal distribution of knowledge about circumstances relevant to a transaction among the parties involved; and finally (4) atmosphere as a collective name for the social and informal interactions which take place among the individuals and groups involved in the transaction.

Applying this framework, Williamson derives arguments for the suggestion that democratic forms of organization such as the "peer group organization" will develop towards hierarchy mainly because of bounded rationality and opportunism (1975, Ch. 3). This idea has been developed further by Williamson (1976) in an instructive study on the evolution of hierarchy in production, where he contrasts the transactional properties of different "hierarchical" and "nonhierarchical" organizational forms.[37])Using the classical example of pin manufacture and evaluating the transactional properties of the different modes by means of ten efficiency criteria[38]) and five socio-economic standards,[39]) he first investigates a simple case in which one worker is associated with each station. Interestingly enough, Williamson agrees with various critics of the capitalist development[40]) in the relative importance of production organization leading to economies of transaction that gave rise to the classical capitalist enterprise, and on the minor weight which has to be attributed at the beginning to technological advances, such as the centralized application of steam power. This comparison by means of a vector whose components are only roughly rated,[41]) of course does not allow for any final conclusions concerning the evolution and survival of the different modes under market conditions, but

[37]) Williamson differentiates between three basic types, each of which has two subtypes: (a) "entrepreneurial modes", where each station is operated by a specialist who owns that station with (i) the putting out system, and (ii) the "federated mode" as subtypes; (b) "collective ownership modes", divided into (i) "communal e. m. h. — every man for himself", where all stations are collectively owned, but an individual claim to the product of the owned labour exists and (ii) "peer groups" where the members are paid according to the average product; and finally (c) "capitalist modes" with (i) "inside contracting", characterized by centralization, capitalist ownership of the means of production, and ordinary contracts between the capitalists and the workers, and (ii) the authority relationship where, in addition, wage contracts are introduced.

[38]) Equipment utilization, buffer inventories, transportation expense, work intensity, talent utilization, interface leakage, shops (local, shops) system, innovation (local, innovation) system.

[39]) Security, affiliation, social esteem, latitude, self-realization.

[40]) See, for instance, Marglin (1974), Stone (1975), Braverman (1974).

[41]) Namely into the grades: »best«, »good«, »poor«, »worst«.

it gives strong hints of a rather good overall performance of the capitalist authority relationship on the one hand, and the "per group organization" on the other hand, if one does not give particular weight to some specific components;[42]) the latter shows some better socio-economic properties, the former seems to perform a little better in terms of traditional efficiency criteria.

As a second step of analysis, the one-man, one-station assignment is abandoned in favor of multi-person station which permits further specialization and division of labour through the realization of multi-person station economies. As a consequence, some non-hierarchical modes such as the "communal — every man for himself (e. m. h.)" and the „federated mode" become basically unviable, and within the other modes, a tendency toward hierarchy results.[43]) In spite of its good socio-economic properties, now even the peer group organization will do significantly worse with respect to the traditional efficiency criteria, whereas the capitalist authority relationship, i. e., the most hierarchical mode of organization, is able to realize multi-person station economies without structural strain. Thus, Williamson (1976, 71) concludes:

> "Certain Peer Group ideals are apt to be sacrificed in the process. Although Peer Group organizations may continue to be viable within work stations, hierarchies are almost certain to appear to mediate relations among stations. The Peer Group ideals of paying every worker the average net product and of making substantive decisions on a fully participative basis are apt to be compromised as a result."

Williamson's considerations on the evolution of hierarchy are necessarily speculative, but also useful in illuminating some aspects of production organization. On the one hand, his comparison demonstrates that an organization of production through pure market contracting will fail because of its poor transactional properties,[44]) and on the other hand his assignment of several persons to one station illustrates the problem inherent in a pure democratic coordination of decision-making within and especially between the work groups. Less convincing appears to us to be his suggestion that the capitalist firm implying an authority relationship will be the most efficient mode of production in the realistic multi-person case. This might be true from a manager's viewpoint, but is not necessarily plausible if one looks at the adaptational properties of production organization with respect to uncertainty, as we will now try to illustrate in a Knightian framework.

[42]) This good overall performance is labeled by Williamson as "near dominance".

[43]) Cf. Williamson (1976, 70f).

[44]) A major disadvantage is the heavy need for buffer inventories and the rather poor adaptional and innovative properties of these modes of production; see, e. g., Williamson's summary of results in Table I (1976, 51).

V. UNCERTAINTY AND ORGANIZATIONAL ADAPTATION

In contrast to the detailed but not necessarily conclusive comparison of different idealized modes of production with respect to several criteria for economic and social efficiency carried out by Williamson, we want to analyze the adaptational properties to internal and external disturbances in order to emphasize both the necessity and the limits of vertical integration of several stages of production; we center especially on the idealized putting-out organization of production.

First, we are looking at the general advantages from labour division in production in dealing with problems of *bounded rationality* (Simon, 1957, 198). In general, the division of labour in production permits a more specialized treatment of problems which arise from the divergency between the extent and the complexity of a task and the limited capability for formulating and performing it. In contrast to other economic agents, the specialized production organization does not only carry out a static optimization process so as to equate the incremental gains from further search, information and calculation with the marginal costs of these operations. This static comparison between the additional gains and costs of different transactions can be carried out by any individual and in any form of organization, and is frequently done even outside the enterprise, for instance by many consumers in buying durable consumption goods. But the firm performs much more than this simple trade-off just by stopping the respective search activities whenever no additional net return is expected but, more important, by influencing the shape of the respective costs and return functions. The firm aims not only at optimizing these transaction costs in the static sense mentioned above but it also attempts to *economize* on these costs, i. e., to *shift* the respective return and cost functions ("to the right" and "to the left", respectively). This economizing is mainly achieved by the concentration of large numbers of individuals and tasks within the enterprise. This concentration leads up to a certain point (to be discussed in the next section) to non-trivial gains from the scale of operation, the possible specialization of tasks in peculiar departments and the organization of activities.[45])

Probably more important than these advantages from intra-firm specialization in these and other tasks are the benefits accruing from internal organization by vertical integration of different stages of production in dealing with uncertainty problems. This is suggested by a comparison between an idealized putting-out system and a traditional capitalist firm. In both of these idealized modes, we observe a capitalist entrepreneur in these sense of Knight (1921, 270): despite the fact that no local concentration or formal authority relationships were involved in the system of subcontracting, also the putter-outer met the

[45]) In similar vein, Jay R. Galbraith (1973, Ch. 2) discusses several strategies for information reduction and increased information processing in the case of internal organization in order to deal with the problems arising from the limited capacity of simple hierarchies (see Section II above). This "shifting of the functions" mentioned here by us is precisely intended to achieve these goals.

characteristics of a Knightian entrepreneur as he was specialized in decision-making, took the risks of selling the finished products, and since he was "given power to direct the work" of other people by the contracts he let out. The putter-outers privileged access to the market, his ownership in part of the inputs involved and the kind of contracts he let out substituted for the lack of a formal authority relationship.[46])

In a way similar to the wage workers of the succeeding factory system, the immediate producers in the subcontracting system could hardly influence the type of contracts which they got offered by the putter-outer, even though they did generally not imply a formal relation of subordination. Frank Knight's oversimplified description of the employment relation as a bilateral insurance contract were the worker is guaranteed a "definite result" of his activity by the risk-bearing entrepreneur as a compensation for his willingness to comply to the entrepreneur's direction,[47]) could be extended to the putting-out system. Similar to the idealized wage-worker who has either to accept the entrepreneur's authority or to leave the enterprise,[48]) the immediate producer in the putting out system had to behave in practice: either he accepted the contract where he was guaranteed a "definite result" of his activity *provided* that he could perform the necessary operations within the stipulated time, or he could refuse the contract and hence "leave the putter-outer"; given the asymmetrical distribution of information and means of production among the parties involved, this came very close to workers' quitting the firm.

The main distinction between both systems has to be seen in the splitting of risks between the immediate producers and the coordination of production. The differences in risk-sharing are mainly attributable to the fact that in the putting-out system there was only a power relationship instead of formal authority and that there was not much integration of production among the different stages.[49]) The risks of production for the immediate producer in the subcontracting system were remarkably higher than those to be taken by a wage-worker as he had to bear the consequences of illness, stoppages in the flow of intermediate products or in the operation of his equipment, or of loss of material himself. But it would be wrong to assume that the risks of the

[46]) Without referring to Knight, also Williamson (1976) considers the putter-outer as an entrepreneur.

[47]) See Knight (1921, 270 seq.). — Interestingly enough, Knight himself does modify this biased view of one-sided entrepreneurial risk-bearing by emphasizing the risks of employment, the danger to life and limb and the risk of human capital devaluation (cf. e. g. 1921, 301 and 350 seq.). For a more balanced view relating factor remuneration to different degrees of factor mobility, see Mueller (1976, Part I).

[48]) For this, see Nutzinger (1976b, Section II and III) with further references.

[49]) In contrast to our idealized description, the historical reality was much more complex: on the one hand, one can find multi-stage production in the putting-out system (for instance "in the cutlery manufacture of Solingen or Thiers or in the needle trade of Iserlohn, the manufacturing process was broken down into as many as a dozen stages, with each cottage shop specializing in one" (Landes, 1966, 12); on the other hand, also different combinations of guild, manufactural and putting-out organization in the production of a simple commodity can be found (cf. e. g., Schremmer, 1970, Sec. c).

putter-outer would have been correspondingly lower for him, as serious problems of coordination in other stages of production could evolve from the non-fulfilment of subcontracts, in the simplest case, for instance, the problem that he could not deliver the contractual amount of production to the final demander. The fact the putter-outer had not to pay the immediate producer even if the non-fulfilment was not the latter's fault did not resolve this problem of coordination.[50]) Even more important and difficult became the function of coordination whenever different parts had to be integrated into one finished product (say, cigars and cigar boxes in the tobacco industry): now, in principle, the putter-outer had to pay the parties who fulfilled their subcontract even if he had no marketable product which he could buy because the other part was missing.[51]) These organizational problems could lead to considerable (static) transaction costs of a contractual coordination of production which are further increased by the costs of contracting and the enforcement of contracts.

Additional elements of uncertainty resulted from the lack of an immediate control of the production process which facilitated the opportunistic behaviour of the subcontractors, such as the misfullfilment of quality standards or stipulated quantities, by "embezzlement and like deceits" (Marglin, 1974). Direct control within the capitalist firm could reduce those elements of uncertainty, and in a similar way the synchronization of the worktime for all employees in the factory instead of the earlier uncoordinated individual choice on worktime, work intensity and leisure, can be considered as a reduction of transaction costs through diminished uncertainty.

This risk reduction through internal organization in the sense of immediate control and coordination of the production process is the less important part of our evolutionary explanation of the capitalist enterprise, however. The increased adaptability of the firm with respect to *external* elements of uncertainty which do not result from the production process itself but from changes of exogenous data, we do consider as the more important advantage of the factory system. This second case we shall term the *dynamic* reduction of uncertainty due to the improved adaptability of the productive organization with respect to changed environmental conditions. Even more important than risks

[50]) As a substitute for the missing immediate control and coordination of the production process, one uses till today *conventional penalties in some contracts* which do not imply an authority relationship. But as the large proportion of employment contracts reveals, this is very often not an adequate substitute for the direct supervision of the process.

[51]) Of course, this problem had been in practice, very often "solved" through a one-sided change of contracts by the central agent of production. But this shifting of risks on to the subcontractors, however, was not a very good condition for the survival of the putting-out system in comparison to the factory system since this was an additional incentive for the producers to enter a formal authority relationship (within the factory). This authority relationship was for them a better protection against misuse of power, especially after the development of modern labour law, and it had at least the advantage that there was a clear distribution of roles between the entrepreneur and the worker which could not be easily changed according to one party's temporary needs.

in the organization of production itself are very often uncertainty and imperfect knowledge about both factor and good markets. Wrong estimates of the saleability of finished products are very costly to handle in the contractarian system, and similar problems in later stages of production will rise from fluctuating input prices. Those unforeseen changes in any of the markets involved will spread over the whole system. In the most important case of good markets we will have a spreading of the miscalculation at the last stage to all the preceding levels, *especially if there the contracts are carried out correctly.*[52]) All transaction costs already noted will enter again as retransaction costs, especially costs from reformulating, remarking, re-bargaining and eventually re-enforcing contracts. This is not only costly, but takes a lot of time. This central shortcoming of a contractual integration of production has been largely overlooked both by economic historians and theorists. Werner Sombart, in his excellent survey of the domestic system, mentios only briefly "the difficulties of carrying out rush-orders quickly enough" (1911, 234). He stresses more the static advantages of factory production such as direct supervision of the working process and the application of big machinery, the latter of which became mainly effective later on in the industrialization process.[53]) This undervaluation of dynamic uncertainty problems comes as no surprise as the putting-out system was hardly established in branches with heavy market fluctuations — I suggest precisely for this reason. The subcontracting system could operate most successfully on the base of either reliable estimates of final sales or on the basis of predetermined orders from the buyers. In the latter case, the putter- outer could not furnish the whole amount of final demand but had to compete with more flexible suppliers, namely modern industrial entrepreneurs, who for this reason alone, apart from all technological and control considerations, had an important advantage over the system of subcontracting.[54]) Certainly, it is always possible to introduce more adaptability into the putting-out system, mainly by building up buffer inventories as has been observed by Williamson *et al. (1975, 255).* But this involves not only higher storage costs (and losses from leakage) than under centralized production, but also restricts the subcontracting mode to producing goods with sufficient storability.

Some indirect support for our suggestion that the advantages of the capitalist firm should be mainly explained by its improved flexibility towards changed external conditions and not so much from mere

[52]) But even non-fulfilment of subcontracts will not help very much since there is no *a priori* reason why changes in the final market would go into the same direction as deviations from preceding contracts. If over-fulfilment is taken to be the less-likely situation, then possibly the putting-out system could better deal with a decrease than an increase of a final demand.

[53]) See, e. g., Marx's lively description of the process in Chapters 11—13 of *Das Kapital*, Vol. I (1867).

[54]) On the other hand, one advantage of the domestic system was the possibility of bringing part-time and seasonal workers into the production process without need of integrating them at high costs within the factory itself.

supervision[55]) can be gained by looking at certain mixed forms of the factory and the putting-out system. An especially ill-reputed mode of production was the so-called *sweating system*, where the immediate producers worked under the direct supervision of the 'sweater': he extracted his profit through the sweat of each worker's brow. Here, the supervision and coordination *at one or few stages of production* was even more detailed than within the factory. The monitoring functions were performed to a large degree by the sweater, and not so much by the putter-outer. The sweater was the residual claimant at the intermediate stage, and the contracting party for the putter-outer. Apart from technological disadvantages and the influence of modern labour law (cf. Sombart, 1911), one important reason for the failure of this system was the insufficient treatment of uncertainty problems in the coordination of the *total* process and hence its rather low flexibility towards changed external conditions. The static accumulation of risks was not very likely to occur here, as uncertainty problems in production at one or a few stages were clearly minimized by the sweaters taut control of the process.[56]) The degree of vertical integration, however, was far too low. Especially the contractual relationship between the sweater and the putter-outer, i. e., the only *indirect* access to the market, created for both parties uncertainty and incentive problems which could be better solved by the modern enterprise through internal organization.[57])

Our consideration of these two modes of production indicates both hierarchy in the sense of a formal authority relationship, vertical integration, and not simply technology and supervision, as the main advantages of the factory system. With respect to both internal and external uncertainty problems, risk-taking over the whole production process by the employer — leaving only some income and employment risks to the wage-worker — was probably a very effective way to reduce the *aggregate risks* borne before by the putter-outer, the immediate producer and possibly some intermediary (such as the sweater) jointly. Neglecting the social conditions of work within the capitalist enterprise one could say that the transition from the putting-out to the factory system was a movement from a Pareto-inferior to a Pareto-superior position implying clear improvements for both parties: the centralization, concentration and integration of work within the factory reduced the transaction costs of production for employer and employees *at the same time*. An important part of this reduction was due to the attenuation of risks by a changed splitting of the respective reponsibilities.

[55]) Even including „metering" in the sense of 'looking on the inputs' which is part of Alchian and Demsetz's explanation of the firm (1972, esp. 778—9).

[56]) Marx's (1867) view of capitalist production as unilateral command relationships seems to be much more justified within the sweatshops than in the classical capitalist firm.

[57]) One of these problems was an inadequate incentive structure in the sweating system: the sweater is not necessarily interested to adapt himself to changed market conditions, even if it is possible, if he would lose money by reducing the production controlled by him in response to impaired conditions on the final markets.

Clearly, under early capitalism the gains form this reorganization were mostly monopolized by the entrepreneur who took advantage of a large mass of "free" wage-workers.[58]) By stressing the comparative advantages of the modern enterprise system, we do not want to assert a mere evolutionary genesis of the capitalist firm; the transfer of political power relationships and the monopolization of information and human capital in the hands of the "masters" (Marglin, 1974) are certainly additional elements of explanation.

VI. LIMITS OF VERTICAL INTEGRATION AND HIERARCHY

Our comparison between the putting-out an the factory system has considered vertical integration instead of market coordination, and formal hierarchy and authority instead of market power, as the main advantages of the modern enterprise in dealing with problems of static and especially dynamic uncertainty. Here, adjustments to unforeseen disturbances are carried out much more rapidly and in the ideal case exactly on that place where the disturbance occurs; no difficult and time-consuming contracting and market adjustment processes are necessary. In addition, capital market imperfections (Crouhy, 1975) and uncertainty in the supply of the upstream goods and the consequent need for information by downstream firms (Arrow, 1975) give additional incentives for vertical integration in order to overcome these uncertainty problems by internal capital market and internal information collection.

On the other hand, the gains from hierarchy and vertical integration are also limited for a variety of reasons. First, the prescribed delegation of decisions will also lead to retardations and distortions in the delegation process; second, and more important, the information processing capacity of higher hierarchy levels is also seriously restricted,[59]) not at least because the need for specific information is much more higher than under market coordination, which basically relies on prices alone. Finally, the consequences of mistakes in information collecting, transmitting and processing will spread in a more or less unrestricted way over the whole organization without direct countervailing feedback mechanisms.[60])

[58]) But even in the nineteenth century, the living conditions of wage-workers were generally judged to be better than of those in the domestic system. For this, see e. g., Sombart (1911) who finds that conditions for the immediate producers in the putting-out mode of production became the more unfavourable the more developed technology was: apparently, bad living conditoins had to substitute for the lack of organizational and technical sophistication. Sombart, however, considers the better opportunities for factory workers to carry out collective actions against their employers (because of their local concentration) as the main reason for the increasing gap between the factory and the domestic system.

[59]) For this, see Galbraith (1973), especially Chapter 2.

[60]) For the advantages and disadvantages, see with further references to the vast literature especially Williamson (1975a, 1975b), Arrow (1975) and Crouhy (1975).

In principle, there are two methods for dealing with this problem: first, one increases the information processing capacity through improved but costly vertical information systems and through reducing the level of hierarchy necessary for the respective decisions by means of lateral relations. The latter strategy, for instance, would change our organizational hierachy (in Fig. 2 above) so that the two managers are communicating with each other instead of delegating the problem to the general manager. The second strategy, however, aims at minimizing the need for information by means of increased autonomy of the single parts and members of the organization[61]) or through reducing the expected level of performance by creation of slack resources. This second and more promising strategy, together with the creation of lateral relations, can be more easily carried out within participatory firms which are characterized by a high degree of autonomy at the workplace and by a more equal distribution of skill, qualifications and human capital than in traditional authoritarian enterprises which are based on a much more equal distribution of these characteristics and the need for high levels of decision-making in order to maintain the hierarchical structure in the interest of capital owners and managers. Workers' participation in decision-making and earnings is likely to create more appropriate incentive and information structures in order to deal with uncertainty problems at the lowest possible level. After centuries of hierarchical firm structures and a technological development adapted to the needs of hierarchy, these advantages of participatory decision-making will not evolve in a natural way, but have to be accomplished against the dominant interests of the bearers of formal, property-related authority.

At the same time, our view suggests that a specialized entrepreneurial function will be called for in all productive organizations although this function is not necessarily and, in general, even not optimally attached to one or a few individuals at the top of the organization; nevertheless, a certain degree of *factual* inequality will be unavoidable. This casts some doubts about the conventional idea of the self-managed firm as a more-or-less unstructured organization of equal members who make all decisions "in a democratic way". Taking into account the functional aspects of hierarchy and authority, the simplistic view of a labour-managed firm as a more-or-less unstructured community of "equal members" who make all decisions "in a democratic way". The mere adoption of elements of political democracy to the firm[62]) does not conform to the needs of the organization of production under the conditions of uncertainty. The economic theory of labour management hence should face the problem of including entrepreneurial functions and divergent interests explicitly into the analysis.[63])

[61]) Increased autonomy can be achieved either through market-oriented decentralization (cf. Section II above) or through the creation of more complex, autonomous "self-contained" tasks (cf. Galbraith 1973 16 seq.). The second possibility, however, could eventually create the problems of "ideosyncratic" top structures analyzed by Williamson et al. (1975).

[62]) For this, in the context of public administration, see Nutzinger (1976c).

Of course, these considerations are incomplete and preliminary. More elaboration, precision and, above all, confrontation of these theoretical considerations with empirical results is urgent if one wants to get more compelling and workable conclusions. As a first step, we quote a few results from existing literature. Burns and Stalker (1961) find that under changing environmental conditions the more flexible and participative "organic" management will be more effective than the traditional "mechanistic" management which works better under rather static external conditions. Similar results can be derived from the empiric study on the Longwall method of coal-getting in England carried out by Trist and Bamforth (1971). Examining E. A. G. Robinson's idea that large firms cannot compete successfully with small firms under conditions of high uncertainty, David Schwartzman (1963, 296) finds that a high degree of uncertainty restricts firm size "because at a relatively small size of firm executives reach their capacity to communicate with associates employers, etc., and to receive and interpret information with adequate speed and accuracy".

If we look at the role of professional management — a major problem both for the theory and practice of workers' participation, then the empirical investigations are far from being conclusive. For instance, in a study of British companies, John Child (1973, 42) finds "that the presence of different requirements across the range of varied operating circumstances in which different companies find themselves, means that there is no single mode of organizing which can serve as an optimum for all situations". Despite this contingency "theory" agnosticism, Child gives lots hints for the need of further decentralization and autonomy within smaller units. In a German-British comparison, Heller and Willpert (1977) emphasize the limits of a "universalistic approach to participation" and therefore they interpret the results in the context of an open systems contingency framework. Their "mindings suggest that the *situation or task* is the real differentiator". And: "The findings show that senior, experienced and presumably successful managers do not use the same decision method in all circumstances" (1977, 77—78). For these and related reasons, Dachler and Willpent (1978) argue for participations as a dynamic system and stressed the need for "the identification of the different kinds of interrelationships among the defining dimensions of participation" (1978, 32).

Our theoretical viewpoint emphasizing the enterprise as one of the social institutions for meeting uncertainty suggests the need for flexible organization combining the advantages of different forms of coordination and the need for participation in the sense of a gradated system of responsibilities. From this viewpoint, it seems to us that the traditional labour division between decision-making and execution has been pushed much too far. It seems reasonable to expect that increased workers' participation in decision-making and earnings is desirable — beyond mere normative consideration which would strenghten the

[63]) See, e. g., the empirical investigations by Adizes (1971, 1975) and the conclusions drawn by Nutzinger (1976a).

argument — because it is likely to increase the effectiveness of productive organization both with regard to socio-economic properties and in terms of traditional efficiency criteria.

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NEIZVESNOST, HIJERARHIJA I VERTIKALNA INTEGRACIJA

Hans G. Nutzinger

Rezime

Ni teorija opšte ravnoteže niti ekonomska teorija samoupravnih tržišnih privreda nišu se sistematski bavile problemima preduzetništva, interne organizacije i osnivanjem preduzeća. Otuda ne treba da čudi mogućnost dokazivanja (pod izvesnim pretpostavkama) ekvivalentnosti opšte ravnoteže u uslovima maksimizacije profita (uz korišćenje modela idealizovanog kapitalističkog preduzeća) i ravnoteže u uslovima maksimizacije per capita dohotka (uz pomoć modela idealizovanog samoupravnog preduzeća) kao što je to pokazao Drèze (1975).

Ovaj članak predstavlja pokušaj razvoja izvesnih konceptualnih prilaza koji treba da doprinesu proširenju teorije firme. Ovi pristupi zasnovani su, s jedne strane, na teorijskim razmatranjima efekata neizvesnosti, i, s druge strane, na određenim empirijskim rezultatima. Najpre se objašnjavaju pojmovi „hijerarhije" i „vertikalne integracije" kao i njihova međusobna povezanost, zatim se po uzoru na Knighta (1921) analizira kapitalistička firma kao metod za suočavanje sa neizvesnošću. Posmatrano iz tog ugla, hijerarhija se javlja kao „meta-pravilo" za nepredviđene situacije: u svetlu složenosti izazvane internim, i, iznad svega, eksternim promenama, specificiraju se pravila o tome ko treba da donosi neophodne odluke. Dalji elementi hijerarhije, povezani sa pomenutim problemima neizvesnosti, nalaze se u nejednakoj distribuciji veština, kvalifikacija i kompetencija odlučivanja po pojedinim poslovima i radnim zadacima, kao i u zahtevima tehnologije, što je izgleda, barem posmatrano na kratak rok, u izvesnoj meri neizbežno čak i u uslovima participacije.

Stav autora članka da ne treba u tolikoj meri direktan nadzor i upravljanje smatrati glavnom prednošću kapitalističke firme, nego da se ta prednost u većoj meri sastoji u vertikalnoj integraciji i specijalizaciji funkcija odlučivanja, potkrepljuje se komparacijama fabričkog sistema sa subkontraktnim načinom proizvodnje sa polukapitalističkim »sweating« sistemom (gde su nadnice minimalne, a radni dan maksimalan). Stoga se povećana adaptivnost kapitalističkog preduzeća u odnosu na eksterne promene identifikuje kao prilično efikasan način suočavanja sa problemima (egzogene) neizvesnosti.

Problemi neizvesnosti unutar firme, međutim, ne sprečavaju potpunu tržišnu decentralizaciju proizvodnje ili autentično demokratski proces odlučivanja unutar preduzeća, kao što to ilustruje poređenje različitih idealizovanih načina proizvodnje. Naprotiv, autorovo razmatranje sugeriše zaključak da će povećano učešće radnika u odlučivanju i zaradama povećati prilagodljivost preduzeća u odnosu i na interne i na eksterne poremećaje zbog toga se na taj način može izbeći preterana centralizacija zasnovana na održavanju formalne vlasti i svojinskih odnosa.