

**COMPUTERS, POWER AND ORGANIZATIONS:
A GAME THEORY PERSPECTIVE**

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ABSTRACT

The well-established relationship between power and games of strategy applies to organizational power, both internally and externally. Rapid Development in computing and information technology have produced dramatic impacts ranging from shifts in the relative power of units in business organizations to changing the nature of work in organizations, to providing strategic advantages that are essential for growth and survival in the global marketplace.

This paper describes the game theoretic implications of the shifts in the relative power of business units, based on results from a study of perceived changes in the power of computing departments. We found that the power of computing departments may still be growing, but the rate of growth may not be as fast as the overall power-through-information growth of the organization. The computing departments' relative rate of power acquisition may be less than that of other parts of the organization.

INTRODUCTION

The well-established relationship between power and games of strategy applies to organizational power, both internally and externally. Rapid developments in computing and information technology have produced dramatic impacts ranging from shifts in the relative power of units in business organizations to changing the nature of work in organizations to providing strategic advantages that are essential for growth and survival in the global marketplace.

This paper concerns the game theoretic implications of the first of these three impacts, based on the results of a study of perceived changes in the power of computing departments.

GAME THEORY AND ORGANIZATIONAL POWER

Power has been defined as the ability to get things done, or the ability to get others to act. It has also been called the use or the exercise of authority [2, 5, and 13]. Game theory is a way to examine organizational concepts such as power because games can be used to model organizational decision situations [37, 46].

Coalitions and power struggles are a part of life in organizations [19], and game theory must deal with those complexities to be relevant to business organizations. Many game models cannot represent all the complexities of real life conflict situations [37]. The zero-sum game, for example,

is the most developed game, but it is least relevant to what happens in organizations because it does not deal very well with conflicts and power struggles which are a part of real life organizations [46].

The concept of power has been associated with organizations for centuries as reflected in Machiavelli's classic work on the acquisition of political power, *The Prince*, in 1513. Information has also long been seen as a source of power beginning as early as the publication of Bacon's *Meditations Sacrae* in 1597 in which he said that knowledge is power.

The view of information and knowledge as a source of power continued in the more recent works of Simon [47] on organization behavior and Shannon and Weaver [45] on communication theory. This view of information as a source of power was extended to the control of information as a source of power with the arrival of computing systems in the 1958 work of Leavitt and Whisler [23] who predicted that computer systems departments would gain power through gathering, storing, processing, and disseminating data and information.

If power is a limited resource [22], then the acquisition of power may be viewed as a zero-sum game and the players can only redistribute a fixed amount of the available resource. According to this traditional view of power, the only way to get more power is to take it away from someone else in the

organization.

If power is not a limited resource, then total organizational power can be increased without decreasing the relative power of any other organization member or element. In that case, a non-zero-sum game exists [37].

A 1989 study of power in American organizations found that the perceived power of computing departments has apparently increased [15]. The study also found that the relative increase in computing department power is seen as being smaller than the corresponding increase of power in the other departments of the same organizations. This difference in the rates of increase makes it appear that the power of the computing department has not increased when it has, in fact, increased. Some of the findings of the study also indicate that the power game in organizations may not be a zero-sum game.

THE NATURE OF POWER

Formal or "legitimate" power based on the position or level of an organization hierarchy is a well-accepted concept [13]. The recognition of informal power or authority has been a more recent acknowledgment that not all authority is based on the position of the power holder in the organization [26].

The virtual monopoly of the control of information and its sources, which computing departments enjoyed until recently, gave them a variety of sources of power because power may originate from sources such as technical or computing expertise. Other potential sources of power include the control of resources such as information, the control of decision making, the apparent non-substitutability of the information processing resource, the reduction of uncertainty, and the creation of a sense of obligation in others [24, 44], all of which are sources of power available to the computing department as the primary providers of information to their organizations.

The relationship between power and information is very complex, and there are many other views of power, including negative views. Some writers, for example, view power as a social evil, and some have an innate distrust of power and power seekers [22]. Some systems professionals seem to fear power so much that they perceive the use of the words "power" and "politics" as a threat [9, 48].

As a result of the complex relationships between power and information and the many perceptions of power, researchers indicate a clear need to understand power to be able to build better information systems [8, 18, 25, and 26].

INFORMATION DEPENDENCY

Power has also been defined as a dependency relationship wherein the powerless is dependent on the powerful for

such things as resources [12]. Since power is seen by some as a limited resource, the ability to acquire resources is considered to be another important source of power [39].

As a result, managers tend to believe that control of an information system is tantamount to control of the organization, and political contests for control of the information function are often very intense [33, 39]. This contest is often settled by a powerful sociopolitical elite or coalition that cooperates to acquire power for itself [18, 22].

The "gatekeepers" of information should be able to gain power because so many people depend on their information. This idea is appealing because of the value placed on information as a resource and it also leads to the belief that systems professionals have power over information users. The belief in the power of the information providers over the information users reinforces the information dependence concept. Both of these concepts are appealing to systems professionals, first, because of the possibility of acquiring power through information and, second, because it is relatively easy to design an information system using this perspective [14, 20, 21, and 27].

COMPUTING AND ORGANIZATIONAL POWER

The validity of the beliefs about the relationship between power and information has spawned research into information as a source of power and into the relative power of the computing department [1, 10, 11, 25, 28, 29, and 42]. The results of some of the studies have been disappointing because there have been conflicting and confusing findings [1], and the real effects of the impacts of information systems on organizations is still poorly understood [38].

The "strategic contingencies theory" of power [16, 17] supported the widely held belief that computing departments would acquire power [27]. Recent research [25, 42] found that, contrary to that popular belief, the computing departments would acquire power. Instead, those studies found that computing departments appear to be losing power, at least in the perceptions of others in the organizations studied.

But what if the power game has changed just as computing departments have changed in the thirty-some years since Leavitt and Whisler [23] made their predictions? Attewell and Rule [1] argued that the probable reason for the many opposing, conflicting, and confusing views of power was not that the observers were wrong, but that several major changes were occurring in computing organizations between 1958 and the present.

When Leavitt and Whisler made their famous predictions, the computing departments were almost the sole source of information processing in organizations. Because the costs of information processing were very high at that time, the computing department held a virtual monopoly on the power sources associated with information gathering, processing,

and distribution because many of those functions were centralized to take advantage of their economies of scale. Recent sharp declines in the cost of computerization make it hard to justify the centralization of computing resources on the basis of economies of scale [30].

Many members of organizations have acquired some information processing knowledge and now share the information processing function with the computing department. This trend toward sharing the information processing function can be seen in several ways including: (1) the decentralized computerization of organizations (distributed systems); (2) the demand for ever faster development of applications and systems which has resulted in the development of educated about computing and information resources because of educated about computing and information resources because of productivity tools for the systems builders; (3) the changes in budgeting procedures so that computing departments are often required to charge for services which they formerly provided free of charge; (4) the advent of the organization information officer and data administrator which indicates a view of information as a resource for the entire organization; and (5) more diverse systems planning and steering committees which also indicate both wider user involvement in the systems development effort and a broader organization view of information as a resource. Users are also becoming better educated about computing and information resources because of more interest in computing by other academic disciplines and because educational institutions are training them in information technology.

These trends indicate changes in the internal power structure and a new power game in organizations. Computing departments have lost their virtual monopoly on information processing and are no longer the sole holders of the power that accrued from the control of information processing. This loss of control might explain the perceived loss of power by computing departments reported in some recent studies [3, 38, and 40].

ORGANIZATION STRATEGIES

Emphasis on the use of information as a resource to gain competitive advantage has become a popular organization strategy [4, 19, and 32]. The concept of competitive advantage primarily concerns the acquisition of power by an organization.

The recommended procedure in seeking a competitive advantage is to use the organization's information systems to help identify organizational strengths and weaknesses. After the strengths and weaknesses are identified, the organization's information systems can be used to help identify opportunities to gain an advantage. Finally, the organization should select a strategy to gain or support a competitive advantage [34, 35].

Information can be of crucial importance in selecting a strategy because information is essential for defining the market place accurately in order to select a "best" strategy [46]. Information is of critical importance in carry out any strategy selected by the organization because information is essential for monitoring the organization, its environment, and the results of its actions in order to achieve an advantage [6, 46]. Thus, the decision to pursue an advantage requires a decision to make more use of the organization's information systems. This decision can therefore lead to increased use of, and emphasis upon, the information technology of the organization; and the increased emphasis on the use of the information systems can affect the perceptions of power in organizations.

Attewell and Rule [1] found that some studies supported the concept of increased power for the computing department, that power change in organizations is not a simple zero-sum relationship, and that several groups may experience or acquire greater power after computerization. If these findings are correct, then the increased use of information systems may increase the overall power of an organization, thus demonstrating that power is not a limited resource but a resource that grows as knowledge increases.

If power is a resource that grows with the organization's use of information technology, this could explain why computing departments have not become more and more powerful at the expense of the rest of the organization ... because as more information and knowledge are acquired by the organization, its TOTAL power resource has grown. Hence, power is not a fixed resource and the power game is not a zero-sum game.

PERCEIVED CHANGES IN THE POWER OF COMPUTING DEPARTMENTS

If power is situational, as management is situational, then there may be an increase in the total power of organizations, not necessarily at the expense of the computing department, but in addition to the power already held by the computing department.

A 1989 study of the perceptions of power of systems and non-systems personnel [15] found that both groups feel that the power of the computing department and the total power of the organization are both greater than in the past.

This study investigated the perceptions of power of seventy-five middle to upper level staff members and managers in thirty-six different companies from across America. Two of the study's hypotheses concerned changes in power perceptions in organizations. The first hypothesis questioned whether there were changes in the locus of power in organizations based upon information processing changes. The second hypothesis asked whether the subjects believed that the computer systems department appeared to be more pow-

erful than in the past. The first hypothesis purports that the locus of power is not changing. The results show significant agreement with the assertion that information is more important to the organization than it was in the past, that information and knowledge is shared more than it was in the past, that the volume of information handling activities of the organization has increased, and that the information processing activity of the subjects' organization entities increased over the last five years [15].

There is significant evidence to reject the proposition that there has not been a change in the locus of information processing as a source of power. This traditional source of computing department power is now more widely shared than in the past. The other entities in the organizations in this study are assuming more of the information processing function and acquiring more information knowledge. Thus it is concluded that there have been changes in the locus of the power in organizations (for example, others appear to have more power from information than they had in the past).

The second hypothesis states that perceptions of changes in the information systems department's power in the past five years have not changed. The results indicate only moderate to strong agreement with the proposition that the computing department is more powerful than it was five years ago; but there was a stronger agreement that the total organizations were more powerful than in the past. This implies that the computing department is perceived by the subjects of the study as somewhat more powerful, but not very much more powerful than it was in the past; and the overall organization is considered to be more powerful than in the past.

These findings support the concept that both the computing department and the rest of the organization appear to have gained power through information processing and affirm the concept that power is not necessarily a limited resource. This research also supports the concept that the power of the computing department is apparently increasing, but increasing at a rate which is less than that of the rest of the organization.

This may explain why Lucas and Saunders and Scamell [42] found that the computing department appeared to be weaker than in the past. Their findings could be the result of a perceived difference in the rate of growth of the power of the computing departments as compared to that of the rest of the organization. Thus, it may have appeared that the power of computing departments had not increased because their rate of increase was smaller than the rate of the power increase in the rest of their organizations.

Another part of the study [15] supports the concept that there is a greater sharing of information processing knowledge and activities in organizations, and that the locus of the source of information power may be changing.

Of the seventy-five subjects in the study, only twenty-

five work in a computer systems department, and only twenty-two of them have systems job titles; but thirty-three of the subjects in the study said that they work in systems functional areas. This means that more people worked in systems job functions (33) than the total number of people working in computer departments in the study (25).

This is an indication that information processing, which was once the exclusive domain of the computing department, is now being performed by more parts of the organization than in the past. Thus, information processing and information knowledge are shared more than in the past; and this can also affect the perceptions of relative power in organizations.

IMPLICATIONS AND CONCLUSION

Information processing and knowledge work are increasingly shared by more of the functional units of the organization as a result of the widespread use of information technology. What was once the exclusive domain of the computing department is now shared with other organizational elements. Thus, the non-substitutability of the computing department that is essential for power acquisition [16 and 17] no longer exists.

The power of the computing department may still be growing, but the rate of growth may not be as fast as the overall power-through-information growth of the organization. This implies that computing departments may, in fact, be more powerful than they were in the past, but that their relative rate of power acquisition may be less than that of other parts of the organization. Thus, computing departments may appear not to be gaining power when they are, in fact, gaining power along with the rest of the organization.

The political power game that takes place in organizations is difficult to define precisely and model effectively. Because the types of games described in normative models are seldom applied to real political settings, descriptive models are usually more suitable for describing the actions and operations of organizations in political power situations, such as are found in real life situations [36, 46].

Power acquisition does not necessarily conform to a zero-sum game, and power is not necessarily a limited resource. If the whole is greater than the sum of its parts, as we have argued, then both the computing department and the organization have gained power, but not necessarily at the expense of any other part of the organization which would be the case if power were a limited resource.

Organizations seeking to gain a competitive advantage must function as coalitions of their members using collective actions to acquire power. Such increases in power may be acquired, in part, from sources outside the organization or from beyond the organization boundaries. It is not necessary to acquire the power of competitive advantage at the expense

of the organization members; and, thus, the power game within an organization may be played as a non-zero-sum game instead of as a zero-sum game [36]. The manner of play is up to the members of the organization and is not dictated by the pursuit or the acquisition of power.

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