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# Degrees of R&D/marketing integration and firms' economic performance

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## Abstract

According to Michael Porter, any firm that wants to have a competitive advantage in the marketplace could adopt differentiation, focus, or cost leadership strategy. No matter which strategy a firm uses, the internal organizational structure should match it in order to perform the strategy effectively. The need or technical differentiation and a good market niche underline the importance of a cooperative partnership between R&D and marketing people. Unfortunately, the relations between R&D and marketing are conflicting rather than cooperative in many firms. This study tries to investigate the relationship between degrees of R&D/marketing integration and firms' economic performance. Pearson Correlation was used to test whether there exists a significant correlation between integration factors and performance indicators. ANOVA was used to test if high-integrated firms perform better in all the performance indicators than mid-and low-integrated firms. The results show that adaptability is positive and significantly correlated with organizational structure and senior management support. Efficiency is positively correlated with the quality of R&D/marketing relations and negatively correlated with organization structure. But effectiveness is only positively correlated with the quality of R&D/marketing relations. Besides, the results also show that high-integrated firms do not always perform better than mid-and low-integrated firms in every performance indicators.

**Keywords:** R&D/Marketing integration, integration, economic performance

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## Introduction

Any firm that wants to have a competitive advantage in the marketplace needs a product with better attributes than--or at least different from--those offered by competitors or with value being perceived to exceed its cost by a great number of customers, or it is in cost leadership position. No matter which strategy a firm uses, the internal mechanisms within it should be properly adjusted to implement the strategy effectively. Marketing people are those who are usually blamed first when a firm fails in the marketplace. But this failure cannot be imputed only to marketing department. The ineffective interaction among marketing and other functional departments in the organization, especially between marketing and R&D departments, is one of The most critical reasons of this failure.

R&D produces the drive to increase market share and sales growth rate of a firm through product revision or innovation. Contrarily, marketing provides the information bearing on customers' needs, market conditions, and competitors' actions; besides, marketing commercializes what R&D innovates. The need for technical differentiation and a good market niche underlies the importance of a cooperative partnership between R&D and marketing people. Unfortunately, the relations between R&D and marketing are conflicting rather than cooperative in many firms.

The causes of conflict between R&D and marketing departments have been examined by many researchers such as Weinrauch and Anderson (1982), and Millman (1982, 1990). Basically, the conflicts arise from the different social cultural backgrounds of R&D and marketing people and their roles in organization. A number of studies have suggested ways to resolve the conflict between these two parties. For example, Gupta and Wileman (1986) have listed what R&D, marketing, and senior management can do to improve the relationships between R&D and marketing. White (1978) has suggested some ways to bridge the gaps between R&D and marketing departments. Some studies have even empirically examined such issues within the context of R&D and marketing interactions (among them being those conducted by Weinrauch and Anderson (1982), and Souder (1977)). But few of them have linked the degrees of R&D/marketing integration to a firm's economic performance.

The purpose of this study is to (1) examine how the degree of integration between R&D and marketing influences a firm's economic performance; (2) investigate the differences among high-, mid-, and low-integrated groups in terms of the three performance indicators, namely, effectiveness, efficiency, and adaptability; and (3) give some managerial suggestions to Taiwanese firms on the issue of how departmental interactions should be managed so that they could achieve better performance.

The interactions between R&D and marketing differ according to the nature of R&D tasks. R&D tasks can be classified into basic R&D and applied R&D. The major task of applied R&D is to commercialize technologies or products successfully in order to meet consumers' needs. One the contrary, basic R&D's major concern is to develop technology and science. This study intends to provide selected examples of Taiwanese firms that are engaged in applied R&D. Thus, it is a study mainly focused on the applied aspects of research and development.

The conceptual model of this study is depicted in Figure 1. The degree of integration between R&D and marketing is determined by four factors. The details are discussed in Section Two. And the economic performance is evaluated by effectiveness, efficiency and adaptability. Again, these indicators are discussed in Section Two.

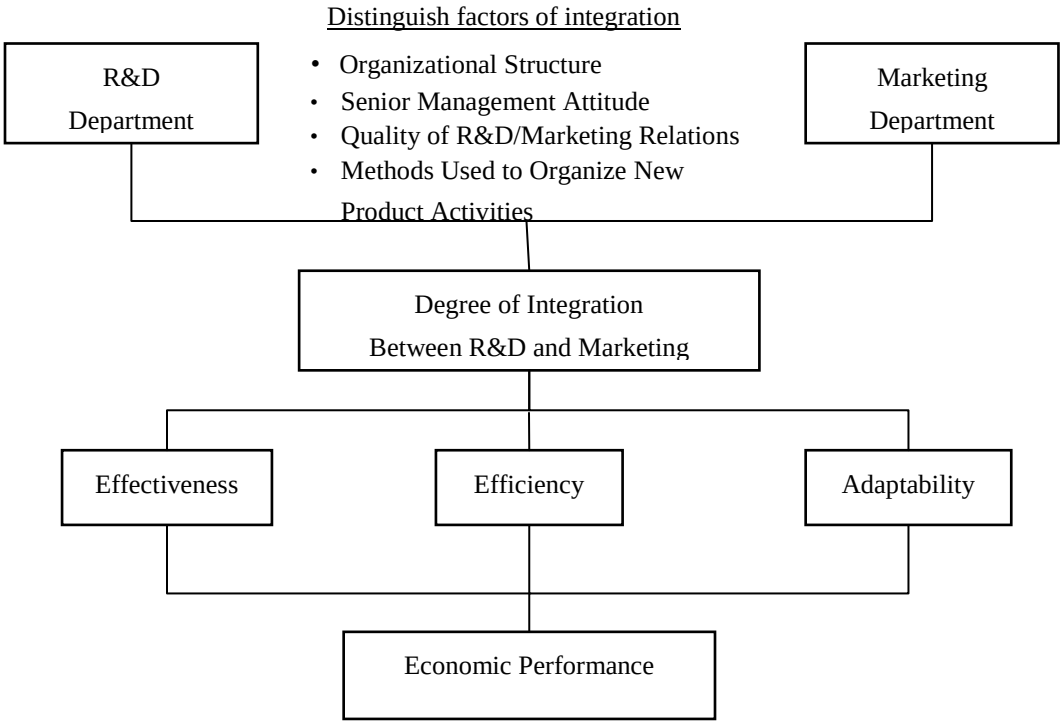


**Figure 1: Research model**

**Source:** Authors' own

## Literature review

### Conflict between R&D and marketing

Many researchers have attributed the causes of conflict between R&D and marketing departments to (1) their roles in organization and their socio-cultural background, and (2) the

strains produced by resource and work interdependency. Both R&D and marketing play key roles in the development of new products and product line extensions. Each of them tends to focus on different tasks. Marketing people are primarily concerned with catering to customers' needs and fending off competitive threats while R&D people focus on the development of technology, inherent quality, and functional features.

Typically, R&D people are independent thinkers, who need not much direct supervision. The evaluation of their productivity is somewhat subjective since there is little quantitative criteria to evaluate and the chance for complete success is relatively low. Their focus, in general, is long-term. On the contrary, marketing people usually start their career as a salesman. They are sensitive to customer needs, market situations, economic and regulatory conditions. The evaluation of their productivity can easily be quantified by sales. Although marketing people participate in long-term decisions, their working environment requires them to handle short-term problems. Thus, their focus is mostly short-term.

As mentioned above, R&D and marketing functions are important in developing new products and expanding markets. Thus, each department depends heavily on the other for information and support.

However, owing to their different perspectives and objectives, conflicts and struggles for influence usually happen. For example, pursuit of technical sophistication and higher levels of functional performance by R&D people sometimes runs directly counter to the desire of marketing and sales to maximize market share. Besides, the stereotyped illusions with which they look at each other (huckster versus ivory tower scientist), distrust and lack of communication aggravate their relations.

**The need to integrate**

Unless a firm has enough confidence that its product will be everlasting in the marketplace, it must keep on product research and development to maintain continuous growth. According to Monteleone's (1976) study, today's profits of high growth rate firms are from products they were not producing five years ago. Besides, the headline in an issue of Business Week declaring that "No doubt it: The more research, the better you do" helps prove the magnitude of R&D. Thus, the importance of R&D in helping firms to reach their growth objectives is obvious.

Since most firms rely on R&D for growth, much money is being spent in improving R&D's capabilities. But merely by throwing in large money is not enough to ensure firms success in the marketplace. Close integration between R&D and other groups is essential for innovations to be

productive. And Thomas has pointed out that because the process of going from useful idea to marketable product requires a joint venture between R&D and all other departments of the firm there is no guarantee of its success even if a firm arrives first with the best product.

A strategy that stresses technology is not necessarily the best, but if a firm decides to exploit technology as a competitive weapon, it had better do more than merely invest in R&D. Indeed, technology can be a powerful weapon on the battlefield of economic enterprise. But increasing R&D investments alone does not ensure that firms will successfully exploit technology as a competitive weapon.

Better planning, communications, and education are all required if there is to be an adequate return on the corporate investment on R&D. When there is adequate attention by non-R&D executives to integrate R&D with other corporate functions, then there is a higher level of R&D performance. In his study, Frohman noted that high performers usually interact more frequently among manufacturing, marketing, and R&D during all phases of activity than low performers. Members of high-performing teams do not simply react to communications from others. They are more likely to be the initiators of communication with outsiders than are those individuals on low-performing teams.

R&D performance is found to be directly influenced by the quality of communication and planning at the interface of R&D with the other activities in the firm. Technical personnel in R&D who tend to know little about the problems and opportunities in marketing and manufacturing should not be allowed to do R&D without guidance from non-R&D executives. On the other hand, non-R&D executives should not be allowed to plan and manage without assistance from the technically trained professionals in R&D who do have the competence required for the predication of new technical events and new technical sources of competition and opportunity.

A high level of R&D performance requires more than a favorable level of communications with top management. And the results of Baker *et al.* (1987) study showed that significant differences can exist in the quality of communications between R&D and the various functional groups in any firm. The indices for quality of communication with marketing, manufacturing, finance, and engineering are each dramatically higher for the high performance group. Successful R&D efforts, then, are shown to have better communication with each of the other corporate groups. Successful firms are the ones that have worked harder at integrating R&D with other corporate functions, by involving these groups in formal reviews of R&D projects, and by putting greater

emphasis on planning and the integration of goals among the functional groups. In this study, the focus is on the integration between R&D and marketing departments.

The relation between R&D and marketing departments is very critical since marketing commercializes R&D's innovations and R&D helps marketing department to satisfy customers' needs. The interdependence of R&D and marketing is perhaps best stated by Butler: The fact is that our research and development activities and our marketing activities are very interdependent. Without a flow of significant innovations coming from the development effort, our marketing team could not be effective. Without an effective marketing team which can translate useful innovations and technological advances into profit-making innovations, our research and development organization could not long pay its bills.

Many studies have pointed out the necessity of R&D and marketing integration. In his empirical study, Souder (1980) documented that products which involve severe interface problems between R&D and marketing are more likely to have a higher percentage of failure. Jaffe (1975) pointed out that by limiting R&D's role to design according to specifications, the marketing manager may be limiting the capabilities of products, and in the end, limiting the selling potential.

If non-R&D has difficulties in communication with R&D, or R&D is left in isolation, then the flow of information about the need for new technology will be restricted. On the other hand, if R&D is unable to communicate with non-R&D about new technical opportunities or problems; then non-R&D will not have the information required for the development of long-range R&D planning which integrates the opportunities and problems of marketing, production, and R&D. The integration of R&D and other corporate functions appears to be the critical determinant of the contribution of R&D to corporate objectives. The decision about what R&D projects are to be funded is too important to be made only by R&D executives. Opportunities and problems in the development of corporate technology must be understood by non-R&D executives.

Another reason for ensuring active communication between R&D and marketing is that most successful product ideas are brought from marketing to R&D. Goldring listed seven sources of stimuli for technological innovation including the requirements of customers, new products of suppliers which change input specifications, development of inventors outside the company, corporate acquisition, the solution of current production problems within the company, and finally, internally generated and science based research. Only 20-to-40 percent of all innovative ideas have arisen from the last source.

Thus, it makes good sense from business viewpoint to say that R&D and marketing should have as much understanding of each other's function and strengths as well as weaknesses as possible to make successful innovation. R&D people must have an understanding of users' requirements and market trend and must be concerned with eliminating technical defects of a new product before transferring it over to a major marketing effort. In proposing marketable ideas to R&D, marketing people should focus on function rather than on specific design. It is the R&D's role to fit design to function. The creativity of R&D people is always diminished when a product is proposed in which major design components are already specified. R&D may be able to provide marketing a better design if it is provided with the actual product needs without preconceived design attributes.

Carroad and Carroad (1982) drew the same conclusion when they said that marketing must be concerned with providing good information, must know the capabilities of the R&D in responding to new demands, must know R&D's technical strengths, and must accept new ideas in an open-minded fashion.

**Measurement of degree of integration**

This study adopts the four factors that Gupta *et al.* (1986) used to distinguish firms in terms of different levels of integration. They are organizational structure, senior management attitudes, R&D/marketing relations, and methods used to develop new products. These factors are discussed as follows.

**Organizational structure**

Firms with different level of integration are usually different in organizational design. According to Gupta *et al*. (1986) the high-integrated firms typically have clearer role definitions; more decision-making autonomy; a high degree of organizational participation in new product decisions; and minimum geographic separation between R&D and marketing.

In high-integrated firms, everyone's responsibility is more clearly articulated via policies, new product development procedures, and job descriptions than those in low-integrated firms. Many of these firms also have written performance standards. The extent they follow these rules and standard operating procedures is called the degree of formalization. Clear policies and procedures help R&D and marketing people know what is expected. They remove much of the ambiguity and stress. They know who is in charge of what activities. Many studies have suggested that by formalizing the relationship between R&D and marketing people, conflicts can be reduced. Rules and standard operating procedures can help clarify each other's role within the relationship and thus increase the integration degree.

High-integrated firms are characterized by a higher degree of decentralization, where employees are delegated authority to make "important" decisions. On the other hand, in the low-integrated firms, very few actions could be taken without approval--even small matters often have to be referred to a superior for a final answer. Decentralized decision-making facilitates communication between different departments contributing to the new product development process. And the tendency to screen unfavorable information or withhold information is less often than in many centralized, hierarchically-structured companies.

Besides, high-integrated firms encourage their R&D and marketing people at all levels to participate in new product development process. The increased involvement, along with the power to make decisions, helps create a climate that results in high creativity. Greater participation also increases the commitment to work through tough problems throughout the entire new product development process. Strict emphasis on a hierarchy of authority reduces organizational innovativeness by encouraging individuals to present only positive feedback about their performance. Reduced participation in decision making also may bar any new insights in the innovation process. By contrast, high degrees of participation can increase employees' commitments to completing projects since they are more likely to get a feeling of ownership. Besides, sophisticated innovations usually require an organizational structure in which experts drawn from different disciplines can be integrated into smoothly functioning teams. Thus, the greater the degree of employee participation in the new product decisions, the greater the degree of integration will be achieved.

In the low-integrated firms, R&D people are usually far away from their marketing counterparts. But in high-integrated firms, the R&D and marketing groups are often in the same building, even on the same floor. Proximity facilitates communication, creates understanding and trust, and reduces product development time. All this nearness in space helps a firm target the right product to its customers at the right time. From the discussion above, this student decides to use formalization, decentralization, degree of participation and geographic distance as the indicators of a firm's integration degree in organizational structure.

**Role of senior management**

Senior management can facilitate as well as hinder R&D/marketing integration. Gruber, Poensgen and Prakke's (1993) study indicated that a major reason for R&D failures is the isolation of R&D forms other corporate functions and the lack of top management support. Senior management plays a crucial role in creating a climate and culture conducive to a collaborative R&D/marketing effort. Senior managers in high-integrated firms could be characterized as interested in promoting the need for R&D/marketing integration and the

tolerance of failure; they also establish joint rewards for R&D and marketing's new product development efforts. And they provide opportunities for R&D and marketing to meet and discuss mutual concerns. Senior managers also take personal interest in the development of new products. Besides, they are committed to innovation and able to balance the long and short-run interests of the firm.

Some other researchers have reached the same conclusions. In the most effective integration cases, Souder and Chakrabarti (1978) found that a joint reward system was used for R&D and marketing, and both groups felt a joint responsibility for the success or failure of the project? Besides, both groups felt that the firm valued cooperation and collaboration between them--they saw many signals from senior management that supported this feeling. Senior management in the high-integrated firm's values and support cooperation between R&D and marketing. They clearly understand that technology alone will not make successful new products. And they realize that brilliant scientists can only take a company so far. Moreover, senior management provides enough incentives for R&D and marketing to work on new ideas, despite the uncertainty of their outcomes.

Management's attitude toward risk-taking has been reported to have a positive impact on innovation success. Statements drawn from the literature further suggest that senior management play an important role in the innovation process by encouraging positive relationships between R&D and marketing. Senior management also takes a long-term view of R&D and has patience and courage to wait. They usually do not cut back on R&D and product development to relieve short-term pressure on earnings.

In high-integrated firms, both R&D and marketing managers in highly integrated firms feel that they share equally in the rewards from successfully commercializing a new product. They do not feel that marketing is given credit for product successes while R&D is blamed for failures, or vice versa. R&D and marketing are jointly held responsible and are jointly rewarded or blamed for the success or failure of a new product. On the contrary, R&D managers in low-integrated firms complain that they receive little credit for commercial success of a new product. These managers also believe that marketers are rewarded for taking risks while they are not, and that marketing's performance measures do not facilitate R&D/marketing integration. There is a general feeling that "Collaboration does not get them anything." Thus, firms with higher support from senior management will achieve higher degree of integration.

**R&D/marketing relations**

The quality of the relations exists between the R&D and marketing groups has the greatest impact on the degree of integration achieved by a firm. In high-integrated firms, both R&D and marketing people can challenge and confront each other in a constructive manner and each is interested in understanding the other's point of view. When conflicts do happen, they are not brushed aside, ignored, or denied. A major effort is made to resolve them. The give-and-take attitude helps build trust and solve problems. As a result, in the high-integrated firms there is a sense of integrity in their communications, and both groups feel free to disagree and discuss opposing viewpoints. In low-integrated firms, R&D perceives marketing's input as lacking credibility.

To involve both R&D and marketing in the earliest stage of new product development is a major difference between high-and low-integrated firms. Early involvement helps reduce development delays, assists in mutual understanding of the customers' real needs, and consequently, develops products to match market needs. In high-integrated firms, the conflicts between R&D and marketing are resolved sooner and at lower organizational levels. The senior management of high-integrated firms is seldom involved in these conflicts resolution since these are handled by the managers at lower organizational levels.

**Organizing new product activity**

According to Gupta *et al.* (1986) high-integrated firms organize their new product activity differently from low-integrated firms. They found that if the firm's president orchestrate the company's new product development process totally, it is more likely to result in less integration between marketing and R&D. Other methods of organizing, such as an R&D manager dominating the new product development effort, or a marketing manager being responsible for the development of new products, or a standing committee approach, are more or less equally distributed among high and low-integration companies. And venture teams are the least popular but most effective method for achieving R&D/marketing integration.

**Measurement of economic performance**

Collier suggested that financial criteria and objective criteria are two major categories of performance. But, Hopkins identified other measures, including present sales by new products, success rates and a global satisfaction score. Performance criteria used in this study including:

1. Sales growth and changes in market share: these indicators are related to the success of a firm's products and programs over its competitors in the mark.
2. Profitability as a percentage of sales and return on investment: from these indicators, the outcome of a firm's using its resources could be seen.

3. The percentage of a firm's current sales made up by new products introduced over the last five years and the success rates for products developed in the last five years: these indicate a firm's ability to respond over time to changing conditions and opportunities in the environment.

**Relationship between integration degree and performance**

The conflict between R&D and marketing absorbs much organizational resources and time. And this can lead both parties to focus on their individual goals at the expense of organizational objectives, thereby reducing the overall performance of the firm. This viewpoint has dominated much of the literature on how conflicts between R&D and marketing affect overall business performance. Another perspective argues that interdepartmental conflicts can have positive effect of forcing each department to reexamine its assumptions and values; thus, the conflicts may increase the creativity and adaptability of the firm in responding to environmental changes; therefore, it is highly desirable to increase the long-term performance of the firm.

This study suspects that both perspectives discussed above have some merit. And this study attempts to investigate the phenomena happening here in Taiwan. In addition, this study would like to see what type of relationship between the R&D/marketing integration degree and a firm's performance does Taiwanese firms match? If the old adage that management's purpose is to get things done through people is somewhat true, then those organizations that are prepared for change and can motivate everyone to pull in the same direction should have an advantage over competitors.

In those firms WHOSE R&D people do not work closely with marketing people, the integration of R&D activity with market realities is haphazard, belated, or both. Yet, commercially successful innovation depends on this sort of integration. Many empirical studies have come to the same conclusion that the closer the link between R&D and marketing, the greater the probability of commercialization (given technical completion.)

**Research hypotheses**

According to the discussion presented above, this study has developed the research hypotheses as follows:

$H_1$: There exists significant correlation between the degree of R&D/marketing integration and economic performance.

$H_2$: High-integrated firms perform better than mid-, and low-integrated firms in terms of economic performance, namely, effectiveness, efficiency, and adaptability.

$H_3$: Mid-integrated firms perform better than low-integrated firms in terms of economic performance, namely, effectiveness, efficiency, and adaptability.

### Research design

A large sample of information firms are used to assess empirically the relationship between R&D/marketing integration degrees and firms' economic performance.

The data base for this study is obtained from Information Industry Yearbook. Because this study investigates the relations between the integration degree of R&D/marketing and economic performance; thus, every firm selected should have these two departments. The population of this study includes all the Taiwanese information firms listed in the yearbook that have separate R&D and marketing functions. Any firm which does not have such clearly defined functions are excluded from the sample frame of this study. It is difficult to receive information about which company has these separately defined functions. Nevertheless, those firms which were engaged in only selling or renting hardware or software to customers are certainly excluded, for they lack R&D functions. Consequently, this study extracts sample from the 205 firms that manufacture hardware and software simultaneously, even though this student does not know clearly which firm fail to have these separate functions. Of course, this would influence the response rate of the questionnaires. But at least, what this student could believe is that the returned questionnaires would come from those firms with clearly defined functions.

Both Statistic Package for Social Science (SPSS/PC+) and Statistical Analysis System (SAS) packages are used as the major analysis tools in this study. Four major statistical analyses are conducted to test the hypotheses developed above such as factor analysis, Pearson correlation, cluster analysis and ANOVA analysis.

## Conclusions

### Research findings and suggestions

The focus of this study is concentrated on whether the degree of R&D/marketing integration has significant influence on a firm's economic performance. Many studies have concluded that the integration between R&D and marketing is very important to economic performance. This study used the sample extracted from Taiwanese information industry to implement the empirical study. The results show that there really exists a significant correlation between R&D marketing integration degree and economic performance.

In the integration dimension, R&D/marketing relations and senior management attitude are significantly and positively correlated with a firm's adaptability. Thus, we could see, owing to the need of mass and the newest information in the information industry, R&D and marketing people have to keep in good touch with the state of the art in technology and the real situation in

the marketplace so as to respond to the environmental changes quickly and effectively. But this needs the efforts and opportunities provided by senior management to facilitate the communication and help them arrive at more collaborative relations.

Efficiency is significantly correlated with R&D/marketing relation, new product development, and organizational structure. And effectiveness is highly correlated with R&D/marketing relations. As the results show, there really exists a significant correlation between R&D/marketing integration degrees and economic performance.

Most information firms in Taiwan still depend heavily on technology import. The R&D/sales ratio is low; thus, irrespective of the integration degree between R&D and marketing, the adaptability of Taiwanese firms in the information industry makes insignificant difference. They are almost all the same in technology development. Thus, they are market followers rather than market leaders. They react to market changes by following steps taken by their counterparts in foreign countries.

But in the matter of efficiency, there exists significant difference among high-, mid, and low-integrated groups. High-integrated firms are the best performers in this aspect. But mid-integrated firms are worse than low-integrated firms. This phenomenon might result from the insufficient communication between R&D and marketing in the mid-integrated firms. The insufficient communication will not bring much benefit to the mid-integrated firms; on the contrary, this might evoke potential conflicts between these two departments. Thus, the mid-integrated firms might not show a better score than low-integrated firm in this aspect. The effectiveness indicators are market share and sales growth rates. In this regard, the mid-integrated firms perform better than the low-integrated firms, although there might be some barriers arising from insufficient communication in mid-integrated firms. And this insufficient communication might lead to misunderstanding between R&D and marketing and to resource waste. However, their integration degree is higher than low-integrated firms. Thus, the R& people in mid-integrated firms receive more market information than do those in low-integrated firms. Thus, their sales growth rate and market share will be better than those of low-integrated firms. Besides, since this study does not include the influences of the production department. There is no guarantee that a firm with larger market share and higher sales growth rate will perform better in efficiency, either.

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