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Diffusion of Knowledge Related to Management Studies and Practical Benefits

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INTORODUCTION

Social scientists have long believed the development of science to be significant for the development of economies and societies. De Tocqueville (1842) held the view that science could become the source of a country's development and wealth; research has provided evidence in support of this claim (Mansfield, 1972; Sveikauskas, 1981). At the corporate level, Taylor (1913), in his work on scientific management, advocated a transformation from management based on "craft" and "art" to that based on "science." In addition, Follet (1918) and Simon (1996) highlighted that science and practice could make good partners.

From the 1980s, researchers in fields such as economics and psychology conducted empirical studies to address the question of what type of effect science has on practice. For example, in economics, it was shown that by acquiring economic knowledge, learners came to behave rationally (i.e., taking ideal actions envisaged in economics) (Carter & Irons, 1991; Frank, Gilovich, & Regan, 1993; Marwell & Ames, 1981). The effects of education were also directly investigated in the field of psychology; it was found that knowledge of psychology does not necessarily reduce psychological bias (Nisbett & Borgida, 1975). Kahneman (2011) even noted that the experiment conducted by Nisbett and Borgida "also supports the uncomfortable conclusion that teaching psychology is mostly a waste of time."

In response to these experiments in economics and psychology, from the 1990s in the field of management studies, the relevance of management theories was actively debated, particularly

among management theorists in the United States (Argyris, 1996; Mintzberg, 2005; Pfeffer & Sutton, 2006; Rousseau, 2012a, 2012b)[1)]. Within this debate, the arguments of Rousseau, Pfeffer, and Sutton et al. on Evidence-Based Management (EBMgt) provided an important point of discussion on knowledge in management studies (Pfeffer & Sutton, 2006; Rousseau, 2012a, 2012b). Some advocates of EBMgt highlight that management practitioners rarely use management studies in workplace decision making. They argue that the reason for this is the gap between management theorists' interest in the establishment of theories and workplace mangers' interest in the pursuit of facts, that is, the question of "how (not why) things go well?"

In this manner, the effects of science on practice have also been debated in management studies. However, the problem is that researchers have not provided an experimental answer to this question. From the standpoint of this research, the argument on the relevance of management theories must begin by answering the following empirical questions: Has knowledge related to management studies diffused across workplaces? If so, through what paths has it diffused and what are the benefits of this knowledge? However, the arguments, including those on EBMgt, have been based on the assumptions that knowledge related to management-studies" and "practitioners do not employ management studies research. Thus, attention has not been focused on the diffusion of knowledge related to management-studies (Latham, 2007). Bloom, Eifert, Mahajan, McKenzie, and Roberts (2013) noted that even though empirical studies have examined its usefulness for management practice, a sufficient body of research on the diffusion of knowledge related to management studies and its effects on practice has not yet been accumulated.

Given the assumptions in the debate over the effects of science on practice, the objective of this research is to conduct an empirical study on the diffusion of knowledge related to management studies. The study has two fundamental research topics. First,

establishing the current state of the diffusion of knowledge related to management studies among practitioners in Japan and factors promoting this diffusion. The second is establishing the benefits of knowledge related to management studies for practitioners.

EXISTING RESEARCH

In this section, the scope of the argument on knowledge related to management studies is first specified, and then hypotheses are derived. "Knowledge related to management studies"[2)] is limited to declarative knowledge about management studies. In cognitive science, knowledge is divided into two broad categories. The first is declarative knowledge, which is concerned with the meaning and names of things and facts, and knowledge expressed by the rules and theorems of phenomena (Rousseau, 2007). Declarative knowledge includes the theories and propositions of management studies, such as "Because of the limitations of the psychological environment of the individual, it is impossible for any decision-maker to be purely rational" (Simon, 1997). The second is procedural knowledge (Rousseau, 2007), which is related to questions on how each phenomenon is performed and stages followed to solve a problem. In organizational decision making, this knowledge corresponds to the expertise required to follow specific procedures. Declarative knowledge answers the question "What is known?," while procedural knowledge answers the question "What should be done?" As Rousseau (2012b) highlighted, up till now most findings provided by management theorists have been declarative knowledge[3)]. In this research, the discussion is restricted to knowledge related to management studies as declarative knowledge. In this article, "the diffusion" of knowledge refers to whether people know the findings of management studies. According to Rogers (1985), diffusion is "a process by which an innovation is communicated through certain channels over time among the members of a social system." Diffusion occurs in a number of stages including, the individual obtains

knowledge on the innovation concerned (the knowledge stage), the innovation is introduced and used (the decision stage), and its advantages and disadvantages are confirmed (confirmation stage). This research focuses on the knowledge stage (what is known and understood) because, above all, the innovation's progression to subsequent stages depends on whether the people concerned have the required knowledge.

Channels for the diffusion of management studies

In the field of mass communication, it has been claimed that only a small amount of the information from mass media is directly transmitted to the public. Instead, a two-step flow of communication comes into play, in which information is transmitted to a large number of people through a small group of people known as opinion leaders (Katz & Lazarsfeld, 1970; Lazarsfeld, Berelson, & Gaudet, 1944). Opinion leaders are a small group of people sensitive to new knowledge and information who pay close attention to media (Rogers, 1995)[4)]. Rogers (1995) explained that in the context of the diffusion of innovation, this small group of users forges ahead of the majority to obtain information on new products and other knowledge. They are known as early adopters. According to Lazarsfeld et al. (1944), early adopters of knowledge are interested in new ideas and try to obtain knowledge from a wide range of information sources not limited to contact with people from the same organization or region. Therefore, they frequently access mass media channels such as radio, TV, newspapers, and books, and acquire new ideas from these sources (Katz & Lazarsfeld, 1970; Lazarsfeld et al., 1944).

Thus, if early adopters mainly acquire knowledge related to management studies from mass media channels, then their knowledge related to management studies increases the more often they access media. From this, the following hypothesis is derived.

Hypothesis 1.1 If other conditions are the same, the more frequently a person accesses mass media channels—reading/viewing books, magazines, newspapers, and websites—the more the volume of knowledge related to management studies is acquired.

The diffusion of knowledge most likely occurs through interpersonal communication channels such as formal and informal conversations within and outside a company (Rogers, 1995). The objective of much of the training conducted within and outside a company is to transmit knowledge to trainees (Baldwin & Ford, 1988). Also, it is thought that informal communication with colleagues and friends functions as a channel for knowledge acquisition. In particular, knowledge transmission in training and meetings frequently occurs through trainers or superiors playing the opinion leader role. Therefore, at the stage of information transmission to other parties, it is likely that the knowledge is filtered through a process of selection and being converted into a form that others can understand. In this manner, even for the diffusion of knowledge related to management studies, if there is a two-step flow of communication (Katz & Lazarsfeld, 1970; Lazarsfeld et al., 1944), then both formal and informal communication function as knowledge transmission channels. This leads to the following hypotheses.

Hypothesis 1.2 If other conditions are the same, the more frequently formal interpersonal communication channels such as training sessions and meetings are utilized within and outside the company, the more the volume of knowledge transmitted related to management studies is acquired.

Hypothesis 1.3 If other conditions are the same, the more frequently informal

interpersonal communication channels such as one-to-one communication are utilized within and outside the company, the more the volume of knowledge transmitted related to management studies is acquired.

Individual characteristics leading to the diffusion of information related to management studies

Mintzberg (2005) proposed art, craft, and science as three essential elements of management. He defined them as follows: Art is intuition that backs up creativity and generates hunches and vision, craft generates practical skills based on the person's own experiences, and science is a person's analytical orientation to find order in the actual state of affairs through systematic analysis and evaluation. Mintzberg (2005) considers science-type practitioners to be those who, during decision making, value sophisticated analytical tools and logical thought. As understood from the assumption that the typical science type is an MBA graduate, science-oriented practitioners generally have a positive attitude toward science and are capable of dealing with abstract concepts. Rogers (1995) noted that early adopters of innovation must acquire new knowledge based on abstract information obtained from mass media or other channels. Thus, they tend to be highly tolerant of abstract concepts and capable of understanding as well as processing them. Therefore, science-oriented individuals are considered capable of both acquiring and understanding knowledge related to management studies, which leads to the following hypothesis.

Hypothesis 1.4 If other conditions are the same, a strong science orientation positively impacts the volume of knowledge possessed related to management studies .

The last factor determining the intake of information related to management studies is

career awareness. Guest (2007) stated that people adopt knowledge when perceiving certain knowledge as useful for solving a work- or career-related problem. However, to do this, a readiness to tackle and resolve the work- or career-related problem is necessary. For career theorists, this corresponds to a "state of high-level career maturity" (King, 1989). Individuals with a high level of career maturity possess a broad range of knowledge and have developed the readiness required to make career decisions appropriate for their age. They accurately understand and are willing to tackle their work- and career-related problems (King, 1989). Therefore, the greater a person's career maturity, the more likely they will apply their knowledge related to management studies to solving their work- and career-related problems. This leads to the next hypothesis.

Hypothesis 1.5 If other conditions are the same, the greater a person's career maturity, the greater the volume of knowledge possessed related to management studies is acquired.

Benefits of the diffusion of knowledge related to management studies

What are the benefits of knowledge related to management studies? Daft (2012) claims, in what is considered to be a standard text on management studies, that "we, who possess knowledge related to management studies, have been taught what has occurred in the past, and in the same way, what will occur in the future, and we use this information to help organizations be managed more efficiently." Individuals who have acquired knowledge related to management studies are expected to contribute to the efficient management of organizations. If, as claimed by Daft, knowledge related to management studies can make an actual contribution, practitioners possessing this knowledge make greater contributions to their organizations than other employees, and consequently should be rewarded more. Here we focus on promotion and monetary remuneration as two typical organizational rewards,

which lead us to Hypotheses 2.1 and 2.2.

Hypothesis 2.1 If other conditions are the same, the greater the volume of knowledge possessed related to management studies, the higher an employee's position in the organization.

Hypothesis 2.2 If other conditions are the same, the greater the volume of knowledge possessed related to management studies, the higher an employee's annual salary in the organization.

III. RESEARCH METHOD

Survey design

A web survey was conducted by a research company between December 6 and 10, 2012. The survey respondents were pre-registered monitors of the research company who satisfied the following conditions: full-time employee, university graduate or equivalent (including having graduated from a vocational college or junior college), and aged between 20 and 65 years at the time the survey was conducted. Responses were requested from 2,818 monitors and received from 1,489 (response rate: 52.8%). Also, of the 1,489 responses collected, the researchers excluded those clearly unsuitable for the sample, such as those who continuously responded with the same value for a specific problem. Consequently, the size of the sample available for analysis was 1,034 respondents.

The average age of the sample population was 44.24 years (standard deviation, 10.0) and 24.85% were women. With regard to company size, 21.3% were employed in a company with fewer than 10 employees, 21.9% in a company with between 10 and 99 employees, 26.3% in a company with between 100 and 999 employees, and 30% in a company with 1,000 employees or more. Examining the respondents' positions within their company, 46.3%

were at a managerial level, 10.6% at foreperson level, 10.3% at unit head level, 13.0% at section head level, 5.6% at department head level, and 14.3% were at a higher positional level. Regarding academic background, 23.5% graduated from vocational or junior colleges, 66.7% had obtained a university undergraduate degree, 8.4% a master's degree, and 1.4% a doctoral degree.

Measurement scale and quantity of descriptive statistics

The quantity of knowledge related to management studies. To select items suitable for measuring the quantity of knowledge related to management studies, and following Scapens (1991), a literature study of management studies textbooks (either originally in Japanese or translated into Japanese) was conducted. The specific procedure was as follows. First, on March 13, 2012, the Kobe University Library for Social Sciences' search system OPAC was employed to extract publications fulfilling the following conditions: "BSH: management studies"[7], "Published after 2009," and "Published in Japanese." The Kobe University Library for Social Sciences was selected as the library to extract the publications for two reasons: first, it houses one of the most pre-eminent collections of social science books in the country; and second, librarians take steps to ensure that there is academic variation when purchasing textbooks for the library, and therefore any arbitrariness on the part of the researchers could be excluded. A total of 84 publications satisfied the search conditions. Of these, research books, mooks (magazine books), those focusing on a different field, those without an index, and manuals focused on a specific field were excluded, resulting in a selection of 28 textbooks[8]. The indexes of these textbooks were reproduced as a spreadsheet; the top 40 index items according to frequency of mentions were extracted by the author[9].

For items measuring the quantity of knowledge, extracted concepts were factor

analyzed. The results of the factor analysis and descriptive statistics are shown in Table 1. Two factors were extracted from the factor analysis. The items loaded onto the first factor were primarily researcher-generated concepts, such as "resource-based view" and "bounded rationality." Items in this group are difficult to understand for practitioners, but there is little room for ambiguity because they are precisely defined. In contrast, items loaded onto the second factor, such as "business strategy," "empowerment," and "individualism" can be understood to some degree through intuition by those who do not understand their strict academic definitions. As these terms can be understood through intuition, they are prone to ambiguity. Based on this interpretation, the first factor was named "understanding of academic terms" (reliability coefficient, Cronbach's alpha = 0.976), and the second factor "understanding of practical terms" (reliability coefficient $\alpha = 0.968$).

The mean value for the degree of understanding of academic terms was relatively low at 2.00, compared with 2.60 for understanding of practical terms. This difference may be because the former is more difficult to understand than the latter. Rogers (1995) stated that difficulty in understanding and using a certain innovation was accompanied by delays in the diffusion of this innovation. Possibly, the same phenomenon occurs for the diffusion of knowledge related to management studies.

Insert Table 1 and about here

Mass media channels. For mass media channels, the following items were measured. For books, the total number of business, economics, and education books respondents read over a period of one month was analyzed. The mean value was 0.57 publications, with a

standard deviation of 1.18. For website views, the total number of regularly viewed business and economics websites as well as blog mailing lists was analyzed. The mean value was 0.78 sites, with a standard deviation of 2.55. For magazines, the total number of business and economic magazines as well as academic journals was analyzed. The mean value was 0.28 publications, with a standard deviation of 1.07. For TV, the time spent in one day viewing business and economic programs was converted into minutes and analyzed. The mean value was 39.98 minutes, with a standard deviation of 68.06. For newspapers, the presence in each home and company of a subscription to Nikkei Shimbun[10], Nikkei Industrial News, Nikkei MJ (a distribution newspaper), Nikkei Veritas, national newspapers (the Yomiuri Shimbun, Asahi Shimbun, Mainichi Shimbun, and Sankei Shimbun), local papers, as well as professional and industry publications were used as dummy variables (1. subscribe, 0. do not subscribe).

Interpersonal communication channels. For interpersonal communication channels, respondents were asked about the number of official meetings they participated in within the company, the number of times they participated in company training in one month, and the number of unofficial consultations they had about work in one month. The mean value for official communication was 4.18 times, with a standard deviation of 6.93, while the mean value for unofficial communication was 4.07 times, with a standard deviation of 9.98.

Beliefs about work. An original item was used to ascertain respondents' beliefs about work. Respondents were asked which of Mintzberg's (2005) three concepts—craft, art, and science—they valued. The factor analysis yielded partially different factors for prior intentions[11]. Items loaded onto the first factor were related to valuing decision making based on objective analysis and logical thinking; specifically, "Decisions about something should be based on the results of an objective analysis" and "It is necessary to think logically about things for work." This is considered to correspond to Mintzberg's (2005) "science," and was

thus named the science type (reliability coefficient α = 0.796). Items loaded onto the second factor were related to valuing decision making based on their own experience and intuition; specifically, "Decisions about something should be based on your own experience" and "It is better to use your own intuition when deciding something." This factor was named the "self-referencing type" (reliability coefficient α = 0.701). The items loaded onto the third factor were related to decision making without specific grounds, such as "It is better to avoid working based on empirical rules as much as possible" and "Scientific knowledge is no use whatsoever for work." Therefore, the third factor was named the "non-referencing type" (reliability coefficient α = 0.686). These factors differed partially in terms of prior intention, although this was not considered a problem in terms of verifying the hypotheses. Thus, it was decided that the results of the factor analysis could be used for the analysis.

Career maturity. Based on the scale developed by Sakayanagi (1999), career maturity was measured from items relating to "career concern" and "career planning." A two-factor structure was obtained from the factor analysis, as was anticipated in advance[12)]. "Career concern" comprised five items, including "I have established a concrete plan to live the way I want" and "I have my own targets about how I want to live my life in the future." The reliability coefficient α was 0.902. "Career planning" also comprised five items, including "I listen attentively to conversations that I can refer to for how to live my life" and "I positively try to collect information that will be useful to me for designing and living my life." The reliability coefficient α was 0.906.

Other. In addition to the above, respondents were asked about their individual profile information, annual income, and present position. These were anticipated to be results variables. For their position, respondents were asked to select from the following levels: manager, foreperson, unit head, section head, department head, or a higher position. The percentages for each category were 46.2%, 10.6%, 13.0%, 5.6%, and 14.3%, respectively.

Their average annual income was 5.613 million yen, with a standard deviation was 643.3.

RESULTS

Table 2 shows the correlation matrix of dependent variables. Tables 3 and 4 show the results of the analysis conducted to verify the hypotheses. Table 3 shows the results of the regression analysis to verify Hypotheses 1.1 to 1.5. The dependent variables were the respective levels of understanding academic and practical terms. The control variables were, age, gender, final academic background, university faculty, type of company the respondent works in, company size, work position, and the work they are engaged in. Some items in Table 3 have been omitted because of space constraints. As there are categorical variables and ordered variables with ages omitted, they were estimated based on the fixed effects model into which the dummy variables had been inserted. However, rather than individual estimates for control variables, these were verified through the random effects model in the Hierarchical Linear Model to confirm the robustness of results. The results are discussed below. Only those variables with a statistical significance of 5% in either of the models were considered to have demonstrated significant effects.

Insert Tables 2, 3 and 4 about here

Results for mass media channel variables relating to Hypothesis 1.1 are as follows. For the level of understanding of the practical terms and academic terms, significant positive effects were found for the number of times books were read per month, monthly subscriptions to the Nikkei Shimbun, and monthly subscriptions to Nikkei Sangyo Shimbun.

However, no significant effects were observed for variables related to the Internet, magazines, and newspapers other than Nikkei publications. The length of time spent watching business and economics TV programs had a positive impact on understanding of academic terms, and while this result was limited to a specific mass media channel, it does support Hypothesis 1.1. Robust results for the official and unofficial communication variables in Hypotheses 1.2 and 1.3 could not be obtained. As it cannot be asserted that these variables produced significant effects, Hypotheses 1.2 and 1.3 were not supported. This suggests that the main channel for transmitting knowledge related to management studies is mass media, and that the role of the interpersonal communication channel is limited.

Next, we consider individual characteristics that regulate the diffusion of knowledge. If we analyze Table 3, we see that, contrary to Hypothesis 1.4, being a science type negatively impacts understanding of practical terms. In addition, it also does not significantly impact understanding of academic terms. Conversely, being a non-referencing type, or someone whose decision making is not based on a particular point of reference, does have a significant effect on understanding of practical terms. Based on these findings, Hypothesis 1.4 was not supported.

Finally, we consider the effects of career maturity. Table 3 shows that career planning has a positive effect on each of the dependent variables. As forecasted by Hypothesis 1.5, career planning facilitates preparing measures independently and proactively to respond appropriately to career problems, as well as to make career choices and promotes the acquisition of knowledge related to management studies. As a result, it has a positive effect on the quantity of knowledge a person possesses.

Table 4 shows the results of the regression analysis to verify Hypotheses 2.1 and 2.2. The dependent variables were work position and annual salary (after being converted to logarithms). As work position is an ordinal variable, estimates were made using an ordered

probit model. Because work position was the dependent variable, it was excluded as a control variable but otherwise the control variables were the same used in the previous regression analysis. Also, as with the previous regression analysis, a hierarchical linear regression model was used to verify the robustness of the results. Table 4 shows that the level of understanding of academic terms had a significant positive effect on work position, although no other significant effects were observed. This finding supports Hypothesis 2.1, but not Hypothesis 2.2. With regard to Hypothesis 2.1, an understanding of practical terms was not seen to have a significant effect on work position, and therefore we must be aware that the scope of this result is limited.

DISCUSSION

Summary and discussion

In this research, which was based on awareness that the relevance of management theories in Japan needed consideration, we searched for factors promoting the diffusion of knowledge related to management studies among practitioners in Japan, and we ascertained the benefits of possessing this knowledge. There were four main findings.

First, the main channel for the diffusion of knowledge related to management studies is mass media—namely books, television, and economic newspapers. Furthermore, the effects of official and unofficial interpersonal communication channels are not that significant. Mass communication researchers note that after new knowledge and products have been diffused to opinion leaders through mass media, this group diffuses the information to the general public through official and unofficial communication channels. This is known as the two-step flow of communication (Lazarsfeld et al., 1944). If this communication flow also occurs for the diffusion of knowledge related to management studies, then the findings described above indirectly suggest that, in 2013, we are not yet at the stage where early

adopters in possession of knowledge related to management studies are diffusing this knowledge to a large number of practitioners.

Second, being a science type impedes the diffusion of knowledge related to management studies. Conversely, being a non-referencing type, in other words not having specific grounds for decision making, is more likely to result in the diffusion of knowledge related to management studies. What is the reason that science-oriented people do not absorb knowledge related to management studies, despite their strong belief in science? A possible explanation is that there is a supply–demand gap between the knowledge provided by management studies and that by science-type practitioners. It is possible that while the knowledge provided to practitioners by management theorists is primarily declarative knowledge (What is known?), science-type practitioners want procedural knowledge (How should it be done?). This supply–demand gap may prevent them from acquiring knowledge related to management studies. In contrast, it is thought that non-referencing types, who do not have specific grounds for decision making, do not excessively dwell on using their own past experiences or knowledge, and therefore more actively absorb declarative knowledge.

Third, career maturity is one factor explaining the intake of scientific knowledge. Guest (2007) noted that a person adopts certain knowledge when it is perceived as useful for solving a work- or career-related problem. However, of the two career maturity factors, it was found that career concern did not have a significant effect on the intake of knowledge related to management studies. Only career planning had a significant effect. This suggests that employing knowledge related to management studies to solve problems means that not only must career be considered but it is also necessary to prepare measures independently and proactively to solve career problems as well as make career choices.

Fourth, possessing knowledge related to management studies is beneficial in terms of promotion. This finding suggests the possibility that practitioners who have studied

management studies use this knowledge to contribute to their organization, and their organization rewards them through promotion (but not through annual salaries).

Implications and directions of future research

The following three points are proposed as the implications of this research.

The first concerns media in which the findings of management studies research are published. Publishing research in an academic journal after completing the peer-review process ensures that researchers provide scientific-level knowledge that their research findings are made available to society, and that other researchers may freely refer to their findings for their own research (Merton, 1942). In this sense, the importance of academic journals cannot be doubted. On the other hand, the results of this research suggest that researchers must be aware that, as of 2013, these academic journals were not transmitting knowledge related to management studies to practitioners.

Second is an implication for practitioners, namely that studying management studies will, to a certain extent, have a positive effect on early promotion. However, they should be aware that the choice of media is important when it comes to acquiring knowledge related to management studies. Also, practitioners must consider that their beliefs about work, whether conscious or subconscious, may interfere with the acquisition of knowledge related to management studies. In particular, it is possible that having a strong science orientation may act at a subconscious level to prevent practitioners from gaining possibly beneficial knowledge.

Third is that absorbing knowledge related to management studies may be beneficial in terms of the bipolarization of the businessperson. According to Rogers (1995), compared to others, many early adopters of innovation possess a wealth of resources and a high position, and moreover it is possible that they acquire an even more superior position than others by

adopting innovations. In other words, the diffusion of innovation involves a mechanism that expands the gap between individuals (Rogers, 1995). The same phenomenon may occur in the diffusion of knowledge related to management studies. Individuals with high career concern and access to a variety of mass media channels are likely to acquire a large quantity of information from it. Moreover, especially in the case of fields of management studies that use difficult academic terms, people who already possess a certain level of knowledge are likely to have a greater absorptive capacity for knowledge (Cohen & Levinthal, 1990), expanding the gap between these two groups even further. Therefore, if the findings of this research are correct, then the quantity of management studies knowledge is one factor determining promotion. Possibly, the knowledge gap that helps determine promotion will in the long term continuously expand the promotion gap between people.

Although we have drawn these implications, the survey design employed for this research made it impossible to clarify in detail the diffusion stages and communication flow for knowledge related to management studies. There is a need to analyze the diffusion of knowledge related to management studies in future research. Also, it will be necessary to use a longitudinal survey to confirm the robustness of the findings on the practical benefits of possessing knowledge related to management studies, and moreover to further investigate whether these benefits are produced because the knowledge stems from management studies, rather than from, for example, economics, sociology, or philosophy.

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FOOTNOTES

[1)] In addition to the EBMgt argument, the following is being debated. Following a discussion of problems for holders of MBAs, Mintzberg (2005) expressed doubts about the relevance of management theories as science, and insisted on a regression from science to elements other than science (experience and intuition). Also, the Academy of Management Review published by the Academy of Management in the United States, published a special feature in 2007 entitled "On the Research-Practice Gap in Human Resource Management," while by 1999, the MIS Quarterly, the leading journal in the field of management information theory, had already published a special feature entitled "Rigor and Relevance in MIS Research." A debate has developed on the usefulness and precision of research in this field.

[2)] Broadly, management studies include disciplines such as accounting, marketing, and finance. However, in this article, its narrower meaning is used. Specifically, within areas of research used by the Japan Society for the Promotion of Science when it is providing research and other costs, management studies is not a branch, but a detailed item (detailed item no. 3901).

[3)] Rousseau and other EBMgt advocates claim that although management theorists should create both declarative knowledge and procedural knowledge, they focus their energies on the former. However, to simplify the discussion in this article, it is assumed that knowledge related to management studies is only declarative knowledge.

[4)] Rogers (1995) divided early adopters into a further two categories. The first are called innovators, which refers to individuals and individual entities that are the first to acquire information on new products as well as other knowledge within the social system. The second are early adopters, namely individuals and individual entities who are not as fast as innovators, but who grasp information faster than most people. To simplify the discussion in this paper, we only adopt the category of early adopters and not the two sub-divisions.

[5] This point can be called an unchanging target of management studies which has persisted since the dawn of management studies. For example, Taylor (2013) repeatedly described a target of scientific management to be the elimination of inefficiencies within an organization.

[7] "BSH" is an abbreviation of "Basic Subject Headings," which is a classification defined by the Japan Library Association.

[8] In the event that an updated edition of the same book had been published after 2009, the updated edition was selected. For translated works, the time standard used was the time of publication of the Japanese translation, not that of the original work.

[9] For the index items, items other than items on concepts related to management studies were excluded. For example, proper nouns were omitted, such as names of people (Michael Porter, etc.), names of companies (DuPont, etc.), and names of items (T-type Ford). In addition, terms in common use, such as "Company Limited" and "leadership" were judged as unnecessary from the viewpoint of measuring knowledge related to management studies, and therefore were omitted.

[10] Nikkei Shimbun is an abbreviation of "Nihon Keizai Shimbun," which is the largest newspaper in Japan, by circulation. This is a Japanese-language daily newspaper with a special emphasis on business and economic news.

[11] The estimation method was the maximum likelihood method and promax rotation. The ratio of factor correlation was 0.11 between the science type and self-referencing type, −0.57 between the self-referencing type and non-referencing type, and 0.11 between the science type and non-referencing type. The Tucker-Lewis index was 0.936. For measurement, a five-point Likert scale from "1. Not at all," through "3. Somewhat," and finally "5. To a great extent" was employed.

[12] The estimation method was the maximum likelihood method and promax rotation. The ratio of factor correlation was 0.70. The Tucker-Lewis index was 0.912. For measurement, a

five-point Likert scale from “1. Not at all,” through “3. Somewhat,” and finally “5. To a great extent” was employed.

TABLE 1
Factor analysis and descriptive statistics of knowledge related to management studies

	Understanding of academic terms	Understanding of practical terms	mean	standard deviation	median
Resource-based view	**.98**	−.22	1.76	1.08	1
Five forces model	**.95**	−.24	1.70	1.05	1
Bounded rationality	**.89**	−.08	1.86	1.11	1
Management process school	**.88**	−.05	1.90	1.13	1
Theory X・Theory Y	**.83**	−.05	1.94	1.19	1
Motivation-hygiene theory	**.80**	.03	1.96	1.18	1
Contingency theory	**.79**	−.02	1.8	1.14	1
Task management	**.73**	.09	1.99	1.19	1
Positioning approach	**.69**	.13	1.94	1.16	1
Cost-leadership strategy	**.68**	.17	2.13	1.25	2
Scientific management	**.65**	.23	2.11	1.23	2
Transaction cost theory	**.64**	.19	2.04	1.19	2
Marketing mix	**.62**	.14	2.12	1.26	2
Need hierarchy theory	**.62**	.21	2.11	1.29	2
Formal organization	**.60**	.22	2.17	1.26	2
Informal organization	**.55**	.27	2.11	1.22	2
Principles of management	**.55**	.32	2.17	1.21	2
Core competence	**.46**	.24	2.04	1.27	1
Differential price-rate plan	**.42**	.37	2.24	1.26	2
Business strategy	−.17	**.92**	2.85	1.34	3
Empowerment	−.18	**.92**	2.87	1.41	3
Individualism	−.19	**.87**	2.98	1.23	3
Differentiation strategy	−.08	**.86**	2.74	1.38	3
Bureaucracy	−.15	**.85**	2.88	1.34	3
Organization structure	.01	**.81**	2.63	1.29	3
Strategic decision making	.09	**.77**	2.53	1.33	3
Focus strategy	.08	**.75**	2.52	1.32	3
Competitive advantage	.16	**.69**	2.53	1.34	3
Job enlargement	.09	**.69**	2.55	1.31	3
Economic man	.15	**.68**	2.46	1.25	3
Limited liability	.12	**.68**	2.59	1.4	3
Growth vector matrix	.17	**.65**	2.43	1.28	3
Motivation factors	.15	**.65**	2.55	1.32	3
Job enrichment	.29	**.54**	2.4	1.26	3
Management control	.30	**.52**	2.35	1.27	2
Separation of ownership from management	.31	**.50**	2.37	1.35	2
Human relation	-	-	2.38	1.27	2
Knowledge management	-	-	2.29	1.34	2
Tacit knowledge	-	-	2.17	1.28	2

Open System	-	-	2.32	1.32	2
Factor loading sum of square	11.39	11.04			
Ratio of factor contribution	32%	31%			

n = 1,034. The estimation method was the maximum likelihood method and promax rotation. The inter factor correlation was 0.75. Questions involving multiple factor loadings were excluded from the analysis and only descriptive statistics were described. The Tucker-Lewis Index was 0.947. For measurement, an irregular Likert scale was used: "0. I have not heard of it." "1. I don't understand it all," through "3. I somewhat understand it," and finally "5. I understand it to a great extent" was employed. When calculating the descriptive statistics and performing the factor analysis, 0 was converted to 1.

TABLE 2 Correlation matrix of dependent variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
No. of times books read	(1)	1																
No. of times websites viewed	(2)	.43	1															
No. of times magazines read	(3)	.50	.44	1														
Length of time spent watching TV	(4)	.41	.45	.39	1													
Nikkei Shimbun subscription	(5)	.32	.29	.33	.29	1												
Nikkei Sangyo Shimbum subscription	(6)	.11	.24	.23	.19	.32	1											
Nikkei MJ subscription	(7)	.09	.13	.13	.14	.20	.31	1										
Nikkei Veritas subscription	(8)	.17	.14	.18	.12	.16	.15	.25	1									
Subscriptions to national newspapers	(9)	.16	.13	.19	.15	.09	.11	.04	.05	1								
Subscriptions to local newspapers	(10)	.01	.02	.01	.03	-.03	.02	-.01	.00	-.12	1							
Subscriptions to professional and industry publications	(11)	.15	.15	.15	.13	.20	.27	.13	.17	.10	.06	1						
Frequency of unofficial communication	(12)	.33	.29	.32	.25	.25	.20	.15	.14	.09	.05	.18	1					
Frequency of official communication	(13)	.30	.28	.25	.22	.27	.16	.11	.14	.10	.03	.17	.54	1				
Science type	(14)	.03	.15	.03	.03	.01	.00	-.01	-.05-	.03	.06	.04	.06	.12	1			
Self-referencing type	(15)	-.01	.00	-.05	.01	-.01	.02	-.01	-.01	.02	-.01	-.03	-.03	-.02	.23	1		
Non-referencing type	(16)	-.06	-.08	-.06	-.07	-.05	.01	-.04	.01	-.07	-.02	-.02	-.06	-.01	-.41	-.05	1	
Career concern	(17)	.35	.16	.13	.14	.03	.02	-.02	-.04	.03	.03	.04	.13	.14	.50	.14	-.29	1
Career planning	(18)	.36	.17	.19	.17	.09	.04	-.02	-.01	.030	.02	.04	.14	.13	.27	.14	-.09	.66

n = 1,034. Spearman's Rank correlation coefficient is used.

TABLE 3: Results of the regression analysis (1)

	Dependent variables: Understanding of academic terms						Dependent variables: Understanding of practical terms					
	OLS			Hierarchical Linear Model			OLS			Hierarchical Linear Model		
Items	coefficient	t value		coefficient	t value		coefficient	t value		Coefficient	t value	
(Intercept)	**0.78**	**2.79**	**	**0.72**	**2.87**	**	**0.77**	**2.46**	*	**0.74**	**2.64**	**
No. of times books read	**0.13**	**4.46**	***	**0.14**	**4.74**	***	**0.14**	**4.28**	***	**0.15**	**4.58**	***
No. of times websites viewed	0.02	1.78		0.03	2.23	*	0.02	1.86		0.03	2.17	*
No. of times magazines read	−0.04	−1.11		−0.03	−0.92		−0.08	-2.08	*	−0.07	-1.94	
Length of time spent watching TV	0.00	1.79		0.00	2.05	*	**0.001**	**2.34**	*	**0.001**	**2.47**	*
Nikkei Shimbun subscription	**0.25**	**3.76**	***	**0.30**	**4.67**	***	**0.21**	**2.89**	**	**0.31**	**4.27**	***
Nikkei Sangyo Shimbum subscription	**0.27**	**2.21**	*	**0.27**	**2.27**	*	**0.27**	**2.02**	*	**0.29**	**2.17**	*
Nikkei MJ subscription	−0.08	−0.46		−0.16	−0.94		−0.05	-0.28		−0.16	-0.77	
Nikkei Veritas subscription	−0.08	−0.30		−0.13	−0.49		−0.27	-0.89		−0.23	-0.75	
Subscriptions to national newspapers	−0.11	−1.91	*	−0.13	−2.21	*	0.07	1.03		0.05	0.84	
Subscriptions to local newspapers	−0.09	−1.48		−0.08	−1.34		−0.10	-1.39		−0.09	-1.35	
Subscriptions to professional and industry publications	0.01	0.09		0.00	0.02		0.05	0.34		0.01	0.07	
Frequency of unofficial communication	0.01	1.89	*	0.01	2.61	**	0.00	0.96		0.01	1.77	
Frequency of official communication	0.01	1.52		0.01	2.30	*	0.01	1.10		0.01	1.96	
Science type	**−0.09**	**−2.10**	*	**−0.09**	**−2.06**	*	−0.00	-0.03		0.01	0.12	
Self-referencing type	0.01	0.11		0.01	0.15		−0.05	-0.96		−0.04	-0.79	
Non-referencing type	**0.18**	**4.39**	***	**0.17**	**4.29**	***	0.06	1.38		0.05	1.09	
Career concern	−0.03	−0.57		−0.06	−1.08		0.06	1.08		0.03	0.56	
Career planning	**0.20**	**4.43**	***	**0.20**	**4.43**	***	**0.17**	**3.38**	***	**0.18**	**3.54**	***
Adjusted R^2		80.79%						90.46%				
F values		7.443	***					6.869	***			

n = 1,034. VIF was below five in each model. Control variables are not shown. The OLS values are the estimated values when the control variables were controlled by the dummy variables. The Hierarchical Linear Model values are the estimated values when the control variables that

became the category variables were controlled by random effects. Both are shown as their robustness was confirmed. Values in bold type are those with a significance level of 5% in both models.

*p <.05
**p <.01
***p <.001

TABLE 4: Results of the of regression analysis (2)

	Dependent variables: Promotion						Dependent variables: Annual income					
	Ordered probit model			Hierarchical Linear Model			OLS			Hierarchical Linear Model		
Items	coefficient	t value		coefficient	t value		coefficient	t value		coefficient	t value	
(Intercept)	-	-		-			4.72	22.15	***	5.32	25.66	***
Understanding of practical terms	−0.09	−0.73		−0.06	−0.48		0.04	1.09		0.04	1.00	
Understanding of academic terms	**0.29**	**2.63**	***	**0.41**	**3.57**	***	0.00	0.12		0.05	1.38	
No. of times books read	0.02	0.28		−0.04	−0.58		−0.03	−1.24		−0.03	−1.20	
No. of times websites viewed	−0.01	−0.33		0.00	0.11		0.00	0.18		0.00	0.19	
No. of times magazines read	0.02	0.25		0.05	0.62		0.05	1.86	*	0.06	2.07	*
Length of time spent watching TV	0.00	0.34		0.00	0.81		0.00	1.14		0.00	0.41	
Nikkei Shimbun subscription	0.24	1.52		0.27	1.69	.	**0.15**	**2.93**	**	**0.26**	**4.99**	***
Nikkei Sangyo Shimbum subscription	−0.06	−0.20		−0.13	−0.45		−0.11	−1.22		−0.06	−0.62	
Nikkei MJ subscription	0.09	0.23		0.04	0.11		−0.07	−0.57		−0.14	−1.03	
Nikkei Veritas subscription	−0.59	−1.02		−0.20	−0.33		−0.19	−0.94		−0.24	−1.10	
Subscriptions to national newspapers	0.10	0.76		0.02	0.15		0.01	0.31		0.01	0.22	
Subscriptions to local newspapers	0.23	1.55		0.15	0.99		−0.08	−1.61		−0.08	−1.54	
Subscriptions to professional and industry publications	0.11	0.41		0.04	0.13		−0.01	−0.11		0.08	0.84	
Frequency of unofficial communication	**0.02**	**2.28**	*	**0.01**	**2.13**	*	−0.00	−1.25		0.00	0.27	
Frequency of official communication	0.01	1.39		0.02	1.48		**0.01**	**3.27**	**	**0.02**	**6.32**	***
Science type	−0.03	−0.27		−0.07	−0.71		−0.02	−0.48		−0.01	−0.28	
Self-referencing type	−0.05	−0.45		0.00	0.01		−0.00	−0.07		−0.02	−0.64	
Non-referencing type	−0.01	−0.08		−0.13	−1.53		0.03	0.86		−0.03	−0.76	
Career concern	−0.01	−0.05		−0.11	−0.83		0.04	0.97		−0.00	−0.05	
Career planning	0.22	1.92		0.19	1.61		−0.02	−0.70		−0.00	−0.09	
Adjusted coefficient of determination								33.92%				
McFadden's R^2		16.31%										
F vales								9.337	***			
Chi-square value		2653.5	***									

n = 1,034. For the “annual salary” dependent variable, the value after conversion to a logarithm was used to reduce the influence of outlier values. VIF was below five for both models. Control variables are not shown. For the estimates from the ordered logit and OLS, the estimates values displayed are for when the control variables that became the categories variables were controlled by the dummy variables. For the Hierarchical Linear Model, the estimated values are for when the control variables that became the category variables were controlled by random effects. Both are shown as the robustness of each was confirmed. Values in bold type are those with a significance level of 5% in both models when annual salary was the dependent variable.

*p <.05
**p <.01
***p <.001