The Effect of Incentives on the Performance of International IT Standardization Experts

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In this paper, we investigate the determinant factors of performance of global standardization experts in their standardization activities. Standards experts of various nationalities were surveyed to assess incentives that may positively influence the performance of standards professionals. As a basis for this study, we make three main assumptions. First, incentives can be important determinant factors of performance among standards experts. Second, standardization is in the public interest, insofar as the efficiency gains resulting from standardization benefit society as a whole. Third, based on this assumption that standardization is in the public interest, we propose that performance determinants for standardization activities tend to be non-monetary in nature rather than monetary. We find that, in order to improve performance among international standards experts, a better understanding of their aspirations and needs must be gained so that appropriate incentives may be proposed to them. Our analysis reveals that the two most important determinant factors of performance are the recognition of the professional status of international standards experts, and an environment providing support systems to help them perform to their fullest potential.

Keywords: Standardization, standards experts, performance, incentive, factors, determinants.

I. Introduction

Standardization is a systematic activity establishing and utilizing standards. It benefits society as a whole, as the process positively affects both producers and consumers by increasing production efficiency and stimulating consumption. This is one reason standardization is regarded as a strategic field not just by companies, but also by government. Standardization activities benefit businesses by helping the technologies that take advantage of them to reflect international standards, thereby giving them an edge over competitors. Standardization also eliminates redundant investments, reducing unnecessary economic costs. Moreover, product standardization is a plus for consumer convenience. Standardization brings down product prices, resulting in real economic benefits for consumers. The importance of standardization and its potential social benefits, in terms of efficiency gain for both producers and consumers, are well understood by both the corporate sector and the government, which are both generously investing in this field.

Performance in standardization is naturally affected by that of individual standardization experts. It is therefore important for national performance in standardization and for overall economic competitiveness that standards experts are properly motivated to make positive and active contributions in the field.[1)] Social and economic benefits of standardization crucially depend upon the level of motivation among professionals at the frontline of the field. Increasing the level of motivation among standards experts requires a basic understanding of the principal variables or factors influencing

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1) The word 'motivation,' stemming from Latin word 'movere,' a verb meaning 'move,' refers to the act or psychological process of causing individuals and organizations to act in a self-propelled manner and sustaining them in such a state of mind [1],[2].

their performance [3]. Here, we define an information technology (IT) standardization expert as an expert who takes part in the activity of establishing standards by initiating or discussing items to be standardized in international standardization organizations which deal with setting up IT related standards.

Determinants of standards expert performance may be divided into monetary and non-monetary incentives. Knowing which of the two types of incentives has greater impact on the performance of standards experts can be of precious assistance in efforts to design performance enhancement strategies [4].

That standardization benefits businesses and consumers alike is a widely-shared view, mentioned in numerous studies. This study is conducted on the assumption that standardization is a public interest field, insofar as its benefits impact society overall [5]. Considering the public interest-oriented nature of standardization and standardization professionals, it is quite likely that the principal determinant factors of performance in this field may not be monetary incentives, and that among non-monetary incentives, especially those that can drive up the level of professional pride and satisfaction and sense of accomplishment may have a greater impact than others. The performance of standardization experts can be assessed by considering their level of participation in standardization activities, such as the number of submissions and acceptance of contributions to standardization organizations, how many times an individual participates in the related meetings or seminars, and how many times such meetings or seminars have been hosted, and so on.

Starting from these basic assumptions, we attempt to establish the key determinants of performance of international standards experts in the IT field. We begin by reviewing the relevant literature to provide a theoretical grounding for the concept of incentive as a motivational tool; then, we empirically determine the factors likely to influence performance using the results of a survey of international standardization professionals. International IT standards experts around the world including the USA, the EU, Japan, and South Korea were surveyed for the purposes of this study. The survey, which lasted from early September 2005 to early November 2005, was conducted both through face-to-face interviews and by e-mail. Most respondents were experts serving as senior committee members with international standards organizations.

II. Literature Review of Performance Determinants

1. The Role and Importance of Standards Experts' Activities

Standardization means creation of a standard, in other words, establishing and conforming to an agreed-upon measure. Standardization increases convenience and reduces costs for consumers, while it simplifies the production process for manufacturers, enabling mass-production and economies of scale and the lowering of production costs. Standardization, therefore, has long been regarded as an important efficiency tool, benefiting both sides of the market [6]. For IT firms, standardization is the key that opens the door to larger markets by ending the discontinuity created by the existence of disparate standards and isolation within local markets [7]. When a technology is adopted as the international standard in the related field, it becomes the norm to which all related products must conform or be compatible or interoperable. This lends a tremendous competitive advantage to the technology, removing all standards-related hurdles for export in the world market. Standardization, therefore, is the crucial arena in the cutting-edge technology race, and the competitiveness of a country as well as a company directly depends on its standardization capabilities [7]. In summary, standardization plays a tremendous role in enhancing the efficiency of the overall economy.

The importance of standardization and standardization activities has been recognized in recent years. This has also made the need for developing human resources to stimulate standardization activities more acutely felt in the past years. Close cooperation between government, standardization organizations, and private-sector businesses is vital for progress in standardization. In particular, the role of companies, the actual implementers and users of standards, cannot be overemphasized. It is crucial that private sector firms take an active part in standardization activities by providing capable technology workers for participation in related processes. This not only benefits the competitiveness of these companies, but that of the economy as a whole [6]. Companies should cease to assign international standardization activities as over-and-above tasks incidental to a position, but create independent, full-time positions for standards officers or allot sufficient time and financial resources for this duty. Standardization achievements must be duly rewarded, and related efforts must be encouraged through incentive programs. It is also desirable to have a rational remuneration policy to appropriately compensate standards officers as employees with expertise in specialized fields.

2. Expected Benefits of Standards Experts' Activities and Stimulation Strategy

The ripple effect to be expected from standardization activities is considerable. By developing trained manpower in standardization and actively engaging in standardization efforts, one can hope for broader adoption of Korean patents and other home-grown technologies as global standards. This will place

Korea in an advantageous position in the international race for technological development, enabling it to successfully contend for the leadership position in key technology fields [8]. Furthermore, standards experts can be a strategic information source for the latest international trends. Staying in touch with global tendencies is of paramount importance for Korea's ability to choose the right directions in technological development. Our prospects in the global marketplace crucially depend on the opportune and timely release of well-targeted products that meet the current demand in overseas markets. Also, the sharing of information among standards experts from different specialization fields will prevent redundant investments, reducing unnecessary capital expenditure. Providing national-level support to joint research projects in global standards and standardization manpower development projects can help accelerate the dissemination of international standard-related information across domestic industry sectors. This will contribute to the harmonization of Korean society and the Korean economy with global practices, a requisite for viably competing in the age of globalization, and will yield long-term benefits for the social and economic progress of this country. Top-level Korean standards experts, serving on standards committees in international standardization organizations or in other important capacities, can be valuable assets, favorably affecting the prospects of our own technologies being adopted as global standards.

Since 2001, to encourage the active involvement of standards experts in international standardization and to tap into the benefits of a dynamic standardization sector, the Telecommunications Technology Association (TTA) has been operating a global IT standards expert program, providing support to select standards experts. Chosen to assume a leading role in making Korean technologies into global standards, these international standards experts serve on the TTA Standardization Committee and defend our interest in the international standardization field by submitting standards proposals and giving presentations. They analyze the latest information in different technology fields, hold standardization meetings and seminars, and publish in journals to share and disseminate related information. They also offer standards consulting to small and medium-sized companies and ventures, and many of them serve as senior committee members at international standardization organizations [9].

The TTA covers expenses for business trips (airfare, hotels, meal allowances, and so on) related to standards proposal submissions, up to twice a year, and other expenses related to information collection [9]. The goals of this program are to help Korean standards experts regularly attend major standards meetings so that they become more visible and influential players within international standards organizations, to train experts in international standardization, and to provide support toward standardization activities in strategic technology fields [8].

The TTA Global Standards Experts are selected by the Expert Committee on IT Standardization Manpower Development, a panel composed of government officials, industry professionals, and researchers. Key selection criteria include basic qualifications required to conduct standardization activities, experience in the field, and potential for continual contribution to the field [8].

To achieve progress in this field of strategic importance, it is essential to ensure that the motivation level is high enough among individuals and businesses participating in the standardization process [6]. It is also essential to tap into the pool of capable private-sector technology manpower and provide adequate support and incentives to encourage their active involvement in standardization.

3. The Role and Importance of Incentives as a Motivation Tool

Incentive programs are designed to motivate an organization's members to achieve better results and performance. These programs reward achievements according to predetermined criteria of performance [10]. The positive effects of incentives on productivity have been proven by numerous studies. The earliest mention of an incentive system and its benefits is found in Hammurabi's Code of Laws. A systemic approach to the use of incentives has been extensively researched since F. Taylor [10]. Vough studied IBM's organization-wide productivity over a 10-year period and found a 200% improvement attributable to incentives [11]. Dierks and McNally, in their study of a federal bank in the State of Arkansas, reported a 200 to 300% increase in productivity which was also attributable to the use of an incentive program [12]. W. James argues that members of an organization that does not have a motivational program perform to only about 20-30% of their potential capability, whereas a motivational program can unleash their potential up to 70-80%. Motivational programs, according to W. James, are an effective as well as indispensable tool for driving up organizational performance [13]. Jenkins and Gupta found that incentive programs have a sizeable positive impact on work performance [14].

Traditional incentive programs resort to direct incentives, in other words, monetary rewards [15]. However, the importance of more comprehensive incentives, satisfying higher-level human desires, has been pointed out by researchers like Vroom. Vroom proposed the so-called motivational force theory which is built around the concept of valence expectancy [16]. Herzberg, the proponent of a theory known as motivation and

hygiene theory [17] held similar views. Peterson described these non-monetary incentives as yielding satisfactions of a physical or psychological order, meeting individuals' egoistic needs or self-realization needs, in other words, appealing to higher-level human desires [18]. Peterson proposed four different types of non-monetary incentives: consideration of the individual, creation of opportunities for self-assertion, creation of opportunities for leadership, and social incentives. Peterson's classification was based on the types of desires and needs of members of an organization that an incentive program is intended to address, rather than its content or nature as such [18].

The importance of non-monetary incentives may be better understood if we take a closer look at the concrete benefits of incentive systems (Korea Institute of Public Administration, 2004). First of all, as a system linking actual performance and achievements to compensation, incentives are a means of motivating greater fairness within an organization. Second, incentives motivate members of an organization to increase productivity and efficiency [19]. Third, incentives are critical to an organization's ability to procure and retain high-quality manpower. Fourth, incentives encourage members of an organization and its standards officers to seek professional development by improving their skills and abilities. The nature of these benefits suggests that incentive programs may be broadened to include non-monetary types of reward, in order to gain in effectiveness.

Non-monetary incentives are especially important for the public sector, where use of monetary incentives is often difficult [19]. Unlike private-sector firms, the performance of individual employees is often not easy to measure or quantify in the public sector, making it ill-suited to a performance-based incentive system. This is all the more true in areas like standardization, with salient public interest characteristics. Moreover, individuals involved in these fields are generally more significantly affected by professional satisfaction and a sense of accomplishment than by monetary incentives [20]. Hence, when designing an incentive program for the public sector, one needs to break away from a narrow notion of incentive as motivation through monetary rewards and consider broader options including non-monetary motivational means. Incentive programs for the public sector must be conceived both in terms of monetary and non-monetary rewards that are apt to motivate public service employees to be self-driven and productive at work [19].

As mentioned above, individuals with appropriate motivation show significant improvement in their performance compared to those lacking motivation [21]. Motivation stimulates an individual's desire to work harder to achieve goals [22]. Therefore, it is important to identify the factors affecting an individual's motivation. The factors affecting motivation include sense of accomplishment, recognition of the accomplishment, responsibility, value of the given task, self-improvement, and so on [23]. Incentive has a positive effect on gaining motivation and improves an individual's performance and active involvement in tasks [24]. In order to make the most of incentives, it is necessary to consider the characteristics of an organization [25], and to design and apply an appropriate evaluation scheme, as well as non-monetary motivational means [26]. Considering the public interest characteristic of standardization activities [27], non-monetary incentives such as sense of accomplishment and satisfaction have a stronger influence on the performance of standards experts than monetary incentives [4], [5]. Honor, promotion, self-development, awards, and improvement of the working environment are some of the many possible motivational non-monetary incentives that take into account inner compensation. In order to improve the performance of standards experts, the TTA has been focusing on non-monetary incentives by operating standardization committees, holding seminars and workshops, selecting standards experts, providing financial support for traveling cost, operating global IT standards expert program, and so on [7].

III. Research Design

1. Survey

The objective of this study is to identify motivation factors able to enhance performance among international standards professionals in the IT field. The non-monetary incentives affecting performance have been analyzed based on the public and professional characteristics of standardization. To collect the basic data on the activities of international standards experts and the factors contributing to performance enhancement, we surveyed standards experts from 18 countries including the USA, Japan, and the EU.

2. Sample Size and Composition

The two-month long survey, which took place between September and October 2005, was conducted through e-mail and face-to-face interviews, on individuals currently serving as standards experts in IT-related international standardization organizations. The 72 respondents were from countries including South Korea, the USA, Japan, France, Germany, and the UK and worked with international organizations such as International Telecommunication Union (ITU), International Organization for Standardization/International Electrotechnical Commission Joint Committee 1 (ISO/IEC JTC1), European Telecommunications Standards Institute (ETSI), or Asia Pacific

Telecommunity (APT). South Korean standards experts accounted for 29.2% of total sample, and non-Korean experts accounted for 70.8%.

For the sake of efficiency of analysis, the respondents were classified into subgroups according to country, organization, type of organization, sub-type of organization, and experience in the field. The type of organization is a variable which distinguishes government organizations from non-government organizations. Sub-types of organization include research institutes, government institutions, schools, associations, and companies.

3. Research Assumptions

For the purposes of this study, we set up the following three assumptions: First, incentives are a major determinant of performance among standards experts. Second, standardization has public interest characteristics, insofar as its benefits are of a social order. Third, based on the high-level hypothesis concerning the public interest characteristics of standardization, non-monetary incentives have a stronger influence on the performance of standards experts than monetary incentives.

4. Questionnaire Design

Questionnaire design is an important step in the preparation of a survey, with far-reaching consequences for the outcome of a study [27]. For the purposes of this study, we introduced a number of modifications to the standard questionnaire format to customize it to the survey sample made up of international standards experts. To elicit active participation from the respondents, we tried to state the background and goals of the survey as clearly as possible and to keep the number of questions to a minimum so as not to distract them unnecessarily. Accordingly, the questionnaire was designed to be answered in 10 minutes or less.

Both open-ended and closed-ended questions were used in the questionnaire. Open-ended questions allow surveyors to obtain more information than they can obtain with closed-ended ones. One disadvantage of open-ended questions, however, is that respondents may feel reluctant to write in their own answers and choose to skip them. Another drawback is the difficulty of interpreting answers to this type of question. Sampling was not random, since it included only persons meeting the precise criteria of currently serving or having served in the past on standards committees of an international standardization organization.

The survey method was quantitative and was conducted both through face-to-face interviews and email. Surveyors attended two ITU meetings and one ASTAP meeting and interviewed 50 standards professionals face-to-face, obtaining 25 valid responses (50% response rate). The face-to-face interviews were coupled with e-mail interviews. Altogether, 500 questionnaires were sent by e-mail, resulting in 50 valid responses (10% response rate). The first series of questions concerns the current level of activity among standards experts [28]. The open-ended questions ask the average annual frequency of attendance at international standardization meetings, the average annual number of standards proposals submitted and proposals adopted, and the respondent's number of years of experience in the field.

The next series of questions regards the motivations that brought the respondents to engage in standardization activities. These questions were multiple-choice, and the respondents were asked to choose three out of seven choices, in order of importance. The respondents were given the option of providing answers that are not among the choices listed in the "other" field at the end of the list. Seven response choices were provided along with a blank space for an open-ended answer. The seven choices included "to stay in touch with international trends in a technology field," "to broaden the adoption of my country's technologies as global standards," "to help with the commercialization of a proprietary technology," "to promote my company," "to contribute to national competitiveness goals," "to broaden the scope of my own professional expertise," and "out of personal interest." The blank space was for respondents to provide motivations other than those indicated by the seven choices. "To broaden the scope of my own professional expertise" and "out of personal interest" were included among the seven choices, and were intended to capture motivations that are more personal, which may be relevant indicators for gauging performance determinants. Most standards professionals are experts in a given technology field, and their involvement in standardization activities most often began as a duty assigned by the organization to which they currently belong or belonged in the past. Therefore, their desire or willingness for continuous and active involvement in standardization efforts may be dependent on reasons other than those directly related to their current or past employment that initially caused them to join the field.

This was followed by questions concerning funding provided toward standardization activities in the respective countries or organizations to which the respondents belong. The respondents were asked to indicate the current level of funding support for different budget areas and to indicate the ideal order of priority they find desirable by assigning relative importance to each budget area, using a 5-point scale.[2] Choices

2) A 5-point scale is most often used to gauge an attitude or opinion, rather than to state facts. In this survey, points are used to indicate the level of funding support that is or should be given to each of the budget areas. The distribution of points was as follows: very high (5 pts), high (4 pts), average (3 pts), low (2 pts), and very low (1 pts).

included operating budget for the standardization organization, standardization-related R&D budget, PR and diffusion budget, manpower development budget, and incentive program on standardization achievements. Respondents are given the option of providing answers other than the listed choices. We included among the budget area choices "incentive program on standardization performance" alongside areas more directly relevant to standardization activities so as to assess how important the respondents think motivational programs are under the current funding program and how important they think they should ideally be, compared to the principal budget areas. Correctly understanding the relative importance of budget areas, according to standards experts' own perception, can be helpful for more accurately assessing performance determinants surveyed in the final section of the questionnaire.

The last two questions regard factors determining standards experts' performance. These questions ask about a) the support programs currently in place in the country or organization to which respondents belong, designed to promote standardization activities and enhance related performance, and b) the performance determinants they believe are most important.

For selection of motivation factors, we consulted numerous past studies on the subject, including Peterson [18] and Jong-soo Lee [13]. Motivation factors considered in this study were both monetary and non-monetary. "Material compensation," corresponding to the monetary factor, and three non-monetary factors, including "opportunities for self-development," "sense of contribution" and "improvement of professional environment for standardization activities," were selected in consideration of the public interest-oriented nature of the standardization field. These performance variables were measured through the following questionnaire items: "Material compensation," the direct monetary determinant, and items related to non-monetary determinants such as "support and interest from the employer," "bonus points toward promotion," "recognition of standardization as an independent professional field," "financial and administrative support toward standardization activities," "active support from government and standards organizations (supply of standards information, hosting seminars, funding support toward participation in overseas seminars, and training opportunities)." The respondents were invited to provide performance determinants that are not listed among the choices in the "other" field.[3)]

3) To the best of our knowledge, prior to this study, there have been no works directly concerned with determinants of performance among international standards experts. The questionnaire for this first-ever survey dealing with the subject was designed based on existing theories of incentives as motivational means. Therefore, the questionnaire items (determinants), used in this survey, may not have theoretical foundations that are fully secure.

IV. Analysis of Survey Results

1. Standardization Activities

The question on the status of standardization activities among international standardization professionals asked the average annual frequency of attendance in international standardization meetings, average annual number of standards proposals submitted and adopted, and the years of experience in the field.

The survey results given in Table 1 show that the respondents attended international standardization meetings about 4.9 times on average in a year. The frequency for Korean standards experts, measured at 3.3, was significantly lower than 5.5, the average among their non-Korean counterparts. By type of organization, the figure was 5.1 for the non-government sector, 5.8 for companies, and 5.3 for non-government organizations, all of which surveyed to attend international meetings more frequently than those from government institutions (3.9).

The number of standards proposals submitted to an international standardization meeting was 4.6 on average annually, of which 2.4 were adopted, equivalent to an adoption rate of almost 50%. The average number of standards proposals among Korean standards experts, tallied at 5.5, was substantially higher than the average of 4.3 among their foreign peers, suggesting a comparatively higher level of activity in Korea. This high level of activity in Korea may be partly attributable to the TTA's Global IT Standards Expert Program, whose selection criteria include the number of proposal submissions and that of adopted proposals. The rate of actual adoption of submitted proposals was 49.2% for the non-government sector, which is significantly lower than 76.2% for the government sector. By length of experience in the field, the rate of proposal adoption tended to decrease as the number of years engaged in standardization activities increased. The causes behind these findings call for empirical investigations by future studies [29].

2. Motivations for Participating in International Standardization Activities

Motivations for participating in standardization activities were surveyed through a multiple choice question with seven answer choices. Respondents were asked to select three answers in the order of importance. A blank "other" space was also provided for this question, where respondents could enter responses other than the seven choices given. As has been mentioned earlier, the seven choices include answers such as "to broaden the scope of my own professional expertise" and "out of personal interest," designed to capture motivations that

Table 1. Average annual international standardization activity per individual expert.

			Number of respondents	Number of meetings attended	Number of proposals submitted	Number of standards adopted	Years of experience
Overall			72	4.9	4.6	2.3	12.3
Country	South Korea		21	3.3	5.5	3.4	9.9
	All other countries		51	5.5	4.3	1.9	13.3
		USA	11	6.0	4.2	1.6	12.4
		Japan	9	3.2	3.3	1.4	9.7
		EU	16	6.7	7.6	3.2	16.1
		Other	15	5.4	1.3	1.1	13.2
Organization	APT		12	3.5	2.4	1.6	15.1
	ETSI		5	7.8	10.2	6.8	8.6
	ISO/IEC JTC1		10	4.3	2.6	1.4	14.0
	ITU		35	5.5	4.7	1.7	12.2
	Other		10	3.5	6.0	4.1	9.6
Type of organization	Government		13	3.9	1.8	1.3	12.2
	Non-government		59	5.1	5.2	2.6	12.3
Sub-type of organization	Research institutes		12	4.8	5.0	3.0	10.4
	Government institutions		11	3.6	1.5	1.3	10.9
	Schools		8	2.9	4.6	2.4	10.1
	Non-government organizations		9	5.3	4.0	2.6	16.4
	Companies		32	5.8	5.6	2.4	13.0

Table 2. Motivations for participating in global standardization activities.

Motivation	Ranking considering order of importance		Overall ranking	
	Rank	(%)	Rank	(%)
To broaden the adoption of my country's technologies as global standards	1	26.4	2	17.1
To contribute to national competitiveness goals	2	25	3	17.1
To stay in touch with international trends in a technology	3	19.4	1	19.0
Other	4	12.5	7	8.3
To help with the commercialization of a proprietary technology	5	9.7	6	10.6
To promote my company	6	4.2	5	12.5
To broaden the scope of my own professional expertise	7	2.8	4	13.4
Out of personal interest	8	0	8	2.0

Note: Overall ranking does not reflect the order of importance indicated by respondents.

are not directly related to specific standardization goals and that may, however, provide relevant clues concerning performance determinants.

As shown in Table 2, the two answers most frequently chosen were "to broaden the adoption of my country's technologies as global standards" (26.4%) and "to contribute to national competitiveness goals" (25.0%), suggesting that public interest-related reasons were the prevailing motivations for involvement in standardization activities. These answers were followed by "to stay in touch with international trends in a technology" (19.4%), "to help with the commercialization of a proprietary technology" (9.7%), and "to promote my company" (4.2%), in this order.

The importance of public interest related reasons remained

Table 3. Current funding priority and desired priority order.

	Current funding priority		Desired priority order	
	Rank	Score	Rank	Score
Operating budget for standards organizations	1	2.91	5	2.88
Standardization R&D budget	2	2.66	1	3.52
Standards PR & diffusion budget	3	2.54	3	3.03
Standardization manpower development budget	4	2.3	2	3.27
Incentive program on standardization performance	5	2.15	4	2.89

Note: 5: very high, 4: high, 3: average, 2: low, 1: very low

Table 4. Comparative analysis of relative importance of budget areas.

Desired priority ranking	High		Low	
Current priority ranking	High	Low	High	Low
Assessment	Adequate funding	Priority funding	Excessive funding	Unnecessary funding
Operating budget for standards organizations	9.2	24.6	12.3	53.9
Standardization R&D budget	10.6	43.9	6.1	39.4
Standards PR & diffusion budget	7.5	24.2	3.1	65.2
Standardization manpower development budget	7.5	34.8	6.1	51.5
Incentive program on standardization performance	4.7	31.2	6.3	57.8

Note: 1. "High" includes 4 (high) and 5 (very high); "Low" includes 1 (very low), 2 (low), and 3 (average).
2. Only scored responses are counted.

undiminished, even when the answers were analyzed without taking into account the order of importance assigned by respondents. The top three responses of each individual were taken into account for the analysis. The overall top choices were "to stay in touch with international trends in a technology" (19.0%), "to broaden the adoption of my country's technologies as global standards" (17.1%), and "to contribute to national competitiveness goals" (17.1%). "To broaden the scope of my own professional expertise," a personal career-related motivation was the fourth most popular choice (13.4%), significantly above the seventh place it occupied in the ranking taking into consideration the order of importance indicated by respondents. An implication of this is that the sense of professional accomplishment is one of the principal motivations, even if not one of the top two or three, that push technology experts to become involved in standardization or continue their involvement in this activity. Professional development and career satisfaction may, therefore, be significant factors influencing the performance of standards experts.

3. International Standardization Funding and Funding Priority

The question concerning international standardization funding asked respondents to indicate the order of priority in the standardization funding program in place in their respective countries or the organizations to which they belong, and the ideal priority order they find desirable. The respondents designated the relative importance, current and desired, of each budget area using a 5-point scale. "Incentive program on standardization performance" was included among budget area choices, to measure the actual and desired level of funding dedicated to motivational purposes.

Concerning the relative importance of budget areas under the current funding program, incentive programs received the lowest ranking (see Table 3). When asked to indicate the desired order of priority, respondents assigned an average score of 2.89 pts to "incentive program on standardization performance." This suggests that, even if the incentive program is not in the upper ranks, either in terms of actual importance assigned or importance that should ideally be assigned, standards experts are nevertheless unsatisfied with the current level of funding support directed to this budget area. It may, therefore, be taken as an indication of a desire existing among standards experts for a stepped-up incentive program, although this interpretation needs to be backed up by further statistical evidence (see Table 3).

As regards the desirable order of funding priority according

Table 5. Determinants of global standardization performance based on perceived availability of incentives.

Overall Rank	Perceived availability of incentives	All countries	South Korea	All other countries				
				Average	US	Japan	EU	Other
1	Support and interest from the employer	3	2.65	3.15	3.2	3.22	3.14	3.08
2	Active support from government and standards organizations	2.8	3.1	2.67	3	2.89	2.36	2.62
3	Financial and administrative support toward standardization activities	2.58	2.8	2.49	2.9	3	2.29	2
4	Recognition of standardization as an independent professional field	2.5	2.45	2.52	3.1	2.22	2.54	2.25
5	Bonus points toward promotion	2.23	2.1	2.28	2.7	2	2.36	2.08
6	Material compensation	1.97	2.11	1.91	1.8	1.78	2.21	1.75

Note: 5: very sufficient, 4: sufficient, 3: average, 2: insufficient, 1: very insufficient

to standards experts' own opinions, they generally regarded budget areas related to the promotion and management of standardization activities as most important. Comparatively lower scores were assigned to "operating budget" (2.88 pts) and "incentive program on standardization performance" (2.89 pts) (see Table 3).

By comparing the current funding priority with the desired priority order indicated by standards experts surveyed, we discerned a number of improvements that may be introduced to budget distribution in standardization organizations. Table 4 gives the results of a comparative analysis between the desired priority ranking and the current priority ranking of the budget areas. Budget areas were each given a score by first dividing them into high and low ranking areas according to the desired priority order, and then according to their ranking according to the current order of priority. These results point to the need to raise the priority level for R&D in standardization and the need for development of and support toward standardization manpower in budget planning as these areas show the widest gap between the current level of support received and the priority ranking according to standards experts' own opinions.

4. Analysis of Determinants of Global Standards Expert Performance

The final questions regarding performance determinants asked standards experts about support programs toward performance enhancement currently in place in their respective countries or the organizations to which they belong, on the one hand, and, on the other, factors they personally believe affect standardization performance. The choices included "material compensation," corresponding to monetary incentive, and five others of a non-monetary order: "support and interest from the employer," "bonus points toward promotion," "recognition of standardization as an independent professional field," "financial and administrative support toward standardization activities," and "active support from government and standards organizations." A blank space was provided for respondents to specify any incentives other than those listed.

The results presented in Tables 5 and 6 suggest that, for most standards experts, institutional support to facilitate standardization activities mattered more than compensation of a monetary or material order. By length of experience in the standardization field, all subgroups thought that "support and interest from the employer" mattered a great deal. However, noticeable differences in perception existed between the subgroups concerning other types of incentives. "Financial and administrative support toward standardization activities" was assigned a comparatively greater significance by respondents with less than 5 years of experience. "Recognition of standardization as an independent professional field" appeared to be more crucial for those having been involved in the field for more than 5 years and less than 10 years, and even more important to those with over 10 years of experience. "Active support from government and standards organizations" was assigned a lesser importance by all respondents; however, its importance increased, as the years of experience of respondents increased. The fact that experienced standards professionals perceive the role of active support from government and standards organizations as more important than others may be an indication that, being senior members of the standardization community, they understand better the need of a planned, government-led support system

The results of a comparative analysis of the six incentives, considering both their current level of availability and relative importance assigned by international standards experts are shown in Table 7.

These results demonstrate that support and interest from the

Table 6. Evaluation of global standardization performance based on relative importance of incentives according to standards experts.

Overall rank	Relative importance of incentives	Overall	Length of experience			
			Less than 5 years	5 to 10 years	Over 10 years	N/A
1	Support and interest from the employer	3.68	3.38	3.56	3.89	5.00
2	Recognition of standardization as an independent professional field	3.61	3.31	3.64	3.72	4.00
3	Financial and administrative support toward standardization activities	3.55	3.62	3.40	3.62	5.00
4	Bonus points toward promotion	3.38	3.31	3.32	3.46	4.00
5	Active support from government and standards organizations	3.21	3.23	2.96	3.41	4.00
6	Material compensation	2.95	2.92	2.92	3.08	1.00

Note: 5: very important, 4: important, 3: average, 2: not very important, 1: very unimportant

Table 7. Determinants of global standardization performance based on both perceived availability and relative importance of incentives.

Relative importance	High		Low	
Perceived availability	High	Low	High	Low
Assessment	Adequate support	Priority support	Excessive support	Unnecessary support
Material compensation	5	27.8	1.7	65.6
Support and interest from the employer	26.1	43.1	4.7	26.1
Bonus points toward promotion	3.2	46.9	7.8	42.2
Recognition of standardization as an independent professional field	12.7	42.9	7.9	36.5
Financial and administrative support toward standardization activities	14.1	46.9	7.8	31.3
Active support from government and standards organizations	10.8	36.9	10.8	41.6

Note: 1. "High" includes 4 (high) and 5 (very high); "Low" includes 1 (very low), 2 (low), and 3 (average).
2. Only scored responses are counted.

employer and recognition of standardization as an independent professional field, far exceeding monetary compensation in importance, were the two most crucial determinants of performance for standards experts.

In addition, responsible behavior in the standardization area, application of knowledge gained to establish national policies, education and training for development of the expertise, contributing to industries, travel cost support, the promotion of activities of standards experts in the international standardization area, and training programs in overseas standardization organizations were given as the factors affecting performance of the experts.

V. Conclusion

This study investigated factors influencing performance among international standards experts in the IT field by conducting a survey of standardization experts and analyzing the results. Our analysis yielded the following key findings: Concerning the status of standardization activities, South Korean standards experts, while they attended international meetings less frequently than their foreign counterparts, submitted more standards proposals, which also enjoyed a higher rate of adoption as international standards. We, therefore, found that Korean standards professionals were more efficient and productive than their overseas peers in their global standardization activities. This analysis, however, is solely based on facts and opinions stated by the participating survey respondents, and do not take into account other statistical data or the quality of individual standards proposals. Regarding motivations of standards experts participating in standardization activities, respondents showed "broadening the scope of their own professional expertise" as one of major elements of the motivation, and we can observe that the experts think individual's professional expertise take important part of the factors affecting their performance.

Next, the results from the survey questions concerning the current budget distribution and priority in standardization funding programs in the country where the respondents reside or the organization to which they belong, and the ideal or desirable priority order according to their opinion, indicated that budget shares must be increased in favor of standardization R&D and standardization manpower development. Finally, concerning determinants of standardization performance, we found that support and interest from the employer and recognition of standardization as an independent professional field were incentives that mattered far more than direct incentives such as material or monetary compensation, and that these two were the most important factors influencing performance.

In conclusion, to enhance the performance of global standardization experts, a better understanding of this professional community must be developed and motivational programs must be used that are appropriate to its characteristics and specifics of the field. Our findings suggest that giving due recognition to the professional status of standards experts and creating an environment supportive and favorable to their activities are the keys to enhancing performance in global standardization.

Finally, during the course of this study, we discovered a number of limitations to our approach. The first was the low survey response rate. In some cases, respondents did not feel that they were in a position to answer certain questions and, in some other cases, respondents felt unsure about the objectives of the survey, in spite of our effort to state them as clearly as possible. We believe these were the chief reasons for the low response rate. Second, the theoretical grounding remains rather meager concerning the choice of performance determinants. This study being the first-ever attempt to determine factors influencing the performance of international standards experts, there is no extant body of literature with direct relevance to this topic. Accordingly, the questionnaire items (performance determinants) used for this study were designed based on theories of incentives, and are somewhat lacking in a solid and unified theoretical underpinning. Third, it is sometimes difficult to be sure how to interpret the results of a study which is based on the subjective opinions of individuals. As the differences between some of the statistical values were rather modest, further study may be needed to determine their significance.

Due to these issues, this study was not able to obtain its intended results. The study, nevertheless, has the merit of being the first attempt to determine factors affecting the performance of international standards experts. It is the hope of the authors that this modest first step in understanding the performance aspects of the standardization field will inspire other researchers to undertake further attempts to shed light on the subject.

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