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Survey of Intellectual Property Rights in the Ergonomics Field in Korea

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Objective: The purpose of this study was to analyze the trend of ergonomics field in overall intellectual property rights in Korea, and suggest the direction for the future development.

Background: Many ergonomists are trying to pursue optimal human well-being and safety, and create more convenient designs for human use. For these reasons, intellectual property rights may be used to protect the legitimate rights of originative and innovative ergonomic designs.

Method: Intellectual property rights were reviewed by using Korea Intellectual Property Rights Information Service (KIPRIS), and then were classified and analyzed according to three intellectual property rights (patent, utility model, design), International Patent Classification (IPC) and ergonomics application areas.

Results: The total number of intellectual property rights registered in the ergonomics field in terms of three intellectual property rights (patent, utility model, design) showed 48,814 which occupied 5.97% of the total registered Korea's intellectual property rights. Within three intellectual property rights, patent (87%) was recorded overwhelmingly higher than utility model (9%) and design (4%).

Conclusion: The current trend of patent, utility model and design in the ergonomics field in Korea tend to increase over time. It is suggested based on the analysis in this study that continuing research and development should be focused on electricity section in accordance with the global trend.

Application: The results of this study can direct the ergonomists to the areas of intellectual property rights in the ergonomics field that should focus on the research and development in terms of three intellectual property rights, IPC and ergonomics application areas.

Keywords: Ergonomics, Intellectual property right, Patent, Utility model, Design, IPC

1. Introduction

Ergonomics, which is also called human factors, and the International Ergonomics Association (2015) defines ergonomics as designing optimal human well-being and total system's operations smoothly implemented by understanding and scientifically explaining interactions between humans and other systems' factors, and applying theories, principles, data and methods. The ultimate goal of ergonomics has significance in helping harmony between humans and the things to interact with humans from the perspectives of human's needs, abilities and limitations.

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Intellectual property right is defined as the knowledge, information, technology, thought or emotional expression, business or indication of objects, organism's species or genetic resources and other intangible things created or discovered by human's creative activities or experiences, and as something of which property values can be realized. Various legal rights on such intellectual property are called intellectual property rights (Kim, 2012; Korean Intellectual Property Office, 2014b). According to the data on intellectual property rights published by the Statistics Korea, the intellectual property right types can be divided into intellectual property right, copyright and new intellectual property right (Kim, 2012). Among these, the industrial property right means the right obtained by applying patent rights, utility model rights, design rights and trademark rights to the Korean Intellectual Property Office (KIPO) and registering them with the KIPO (Korean Intellectual Property Office, 2014b).

Many ergonomists create more convenient, safe and efficient designs to pursue optimal human well-being, which is the goal of ergonomics. Because, such designs change in line with human characteristics, there can be many designs that bring about creativity and technological innovation that could not be found in the past. Ergonomic designs can affect the contemporary industries, and companies can create profits by selling ergonomic products that can represent human needs. For example, clothes, beds, chairs, refrigerators and washing machines manufactured with ergonomic designs have competitiveness, compared to other products. As such, companies and ergonomics are closely related, and therefore, rights on ergonomic designs are regarded as important. To obtain such rights legitimately, the importance on the interest in intellectual property rights, namely, patents, utility models and designs, which correspond to industrial property rights, emerges.

The intellectual property rights registered through the efforts of domestic and international organizations and researchers so far are gradually on the rise, and these intellectual property rights are managed by each government. Currently, the database of intellectual property rights is made, and is publicly open to all organizations, companies and individuals, and relevant statistical research is also actively carried out. In Korea, studies that examined the trends in intellectual property rights based on the data disclosed by KIPO, such as Korea's Patent Trend Report provided by KIPO (Korean Intellectual Property Office, 2015) and a study of Lee et al. (2004), can be found. Internationally, the IPC Trend Report of the World Intellectual Property Organization (2015) is also found. However, the studies on the intellectual property rights in the field of ergonomics are minimal thus far, and more studies are considered to be needed.

Concerning the trend in intellectual property rights in the ergonomics field, contemporary human needs can be conjectured, and also the future of ergonomics can be predicted. In this regard, the purpose of this study is to examine and classify the intellectual property rights in the field of ergonomics, identify the position and development status of Korea's entire intellectual property rights, and suggest future development direction through analyses on the classification of intellectual property rights and yearly trends in the ergonomics field.

2. Method

2.1 Survey tools

This study used the Korea Intellectual Property Rights Information Service (KIPRIS) as a survey tool for intellectual property rights. KIPRIS is operated by the Korea Institute of Patent Information, and is the service making the database of all information on the intellectual property rights offered by KIPO, and enabling users to search and read using the Internet (Korean Institute of Patent Information, 2015). KIPRIS began its service in 1996, offered the service free of charge in 2000, and steadily expanded the service. KIPRIS has currently expanded its service areas into idea contests search service, as well as overseas designs search.

2.2 Method to select and search keywords

To search domestic intellectual property rights in the field of ergonomics, this study extracted six keywords, namely, ergonomics, human technology, serviceability, convenience, accessibility and usability by referring to the definitions of ergonomics presented by Human Factors and Ergonomics Society (2015), International Ergonomics Association (2015), Chung (2009), Chung et al. (2014), Jung (2015), Kim (2015) and Lee (1995). The extracted keywords were classified into three rights, patent, utility model and design, suitable for the purpose of this study, and the intellectual property rights, for which administrative measure was registration, were targeted for search. This study also targeted the intellectual property rights, of which applicants' address was within Korea's administrative district in order to investigate domestic intellectual property rights. As for search period, this study targeted the intellectual property rights registered during the effective period of each intellectual property right (Patent, utility model and design from July 1, 1996, January 1, 2005 and January 1, 2000, respectively, to December 31, 2014, respectively). Regarding search method, this study searched through the revision of search formula according to focus by each right classification, IPC classification and ergonomics application area using the operators of KIPRIS. As for the KIPRIS operator used in this study, the '+' operator showing a search result, even when one keyword is included among the searched keywords, and the '*' operator revealing a search result, when all the keywords are included, were used. The search formula was set up as keywords*search period*applicant's address, and the search results were drawn by changing the keywords and search period according to each focus. The factors changing according to each focus were keywords and search period, and the applicant's address was fixed.

2.3 Selection of intellectual property rights classification criteria in ergonomics field

This study analyzed the trends of intellectual property rights in the ergonomics field by classifying the intellectual property rights in the field of ergonomics, surveyed through KIPRIS, into patents, utility models and designs. For detailed classification, patents and utility models were classified using IPC and ergonomics application areas, and designs were classified using Korean Design Classification.

This study researched focusing on industrial property rights closely related with the ergonomics field among the intellectual property rights. Especially, this study targeted patents, utility models and designs, which are related with ergonomic definitions the most, since trademarks' relevance with ergonomic definitions is low. An intellectual property right has the term of existence that means the period of right's effectiveness: patent - 20 years, utility model - 10 years, design - 15 years (Kim, 2012; Korean Intellectual Property Office, 2014b). Therefore, this study had common search formula for basic keywords to identify the registration cases by the classification of rights in the field of ergonomics as (ergonomics+human technology+serviceability+convenience+accessibility+usability), and the applicant's address as AP=[Seoul+Busan+Daegu+Ulsan+Gwangju+Daejeon+Incheon+Sejong+Gyeonggi+Gangwon+Chungcheong+Gyeongsang+Jeolla+Jeju]. Search period was searched by setting up GD=[19960701~20141231] for patent, GD=[20050101~20141231] for utility model, and RD=[20000101~20141231] for design.

International Patent Classification (IPC) is an international classification symbol established by the World Intellectual Property Organization (WIPO) in 1975 according to the Strasbourg Agreement Concerning the International Patent Classification in order to unify patent classification systems globally (Jung, 2015). IPC classifies technological fields by section, namely into the following eight sections: A: Human necessities, B: Performing operations; transport, C: Chemistry; metallurgy, D: Textiles; papers, E: Fixed constructions, F: Mechanical engineering; Lighting; Heating; Weapons; Blasting G: Physics, H: Electricity. Because, patents and utility models were classified using the same classification criteria as the IPC, this study revised keywords by adding (ergonomics+human technology+serviceability+convenience+accessibility+usability)*IPC=A~H to the keyword search formula by the classification of rights in the ergonomics field.

Ergonomics application areas are differently classified by each expert, and they are classified into physical ergonomics, cognitive

ergonomics and organizational ergonomics in a broad sense (International Ergonomics Association, 2015). According to the definition of IEA, physical ergonomics is to consider human anatomical, anthropometric, physiological characteristics related with physical activities. Cognitive ergonomics is to take into account mental process like perception, memory, inference and motor response, and organizational ergonomics means considering the optimization of social and technical systems (organizational structure, policy and process). Meanwhile, Kim (2015) classified such a classification in more detail. That is, Kim classified ergonomics application areas into the design of working methods, design of machinery and equipment, design of instruments and tools, design of workplace, design of computers, design of clothing and footwear, design of furniture and household goods, environmental engineering, control engineering, and industrial design in more detail than the classification of IEA. This study classified intellectual property rights, based on more specific application areas of Kim (2015) than the application areas in a broad sense defined by IEA. Therefore, a total of 11 keywords were selected: (working*method), [(machinery*design)+(equipment*design)], [(instrument design)+(tool design)], (workplace*design), (computer*design), [(clothing*design)+(footwear*design)), [(furniture*design)+(household goods*design)), (environmental engineering), (control engineering), (industrial design), (bio*electronic*engineering). Also, the keywords of each application area were revised as (ergonomics+human technology+serviceability+convenience+accessibility+usability)* (keywords by application area).

Although, the meanings of patents and utility models are similar, their meanings become different according to the sophistication of inventions. Consequently, classification like IPC can be simultaneously applied. However, designs have different criteria from patents and utility models, and the classification method of designs is different. Two methods, the Locarno Classification and Korean Design Classification, are used together as to the current method to classify deigns in Korea. The Locarno Classification is used for control purpose, and the Korean Design Classification is used for prior design search and substantive examination. This study used on the basis of the Korean Design Classification used for design search and substantive examination in terms of design classification criteria. The Korean Design Classification divides designs into 13 groups excluding the alphabet, "I" (A: Food manufacture and item of personal preference, B: Clothing and personal belongings, C: Beddings, cooking utensils, household items, D: Articles of housing equipment, E: Recreational goods and athletic goods, F: Office supplies and articles on sale, advertising tools, G: Transport or conveying machinery, H: Electrical and electronic equipment and apparatus and telecommunication devices, J: General machinery and implements, K: Industrial machines and equipment, L: Civil engineering and construction supplies, M: Textile piece goods, N: Not elsewhere specified goods), and forms sub-classification system with large scale classification, middle scale classification and small scale classifdfiat5ion, according to each group (Korean Intellectual Property Office, 2014a). The resultant search formula of design was (ergonomics+human technology+serviceability+convenience+accessibility+usability) *DC=A~N), and the keywords were revised.

2.4 Analysis method

This study analyzed with the registration numbers of the patents, utility models and designs searched by the KIPRIS search formula. For the analysis by classification, this study analyzed the registration numbers of patents, utility models and designs with each classification method (IPC, ergonomics application areas and Korea Design Classification), and then resulting rates, and carried out yearly trend analysis on the patents, utility models and designs.

2.5 Research procedure

As shown in Figure 1, the procedure of this study was searching data using KIPRIS, a survey tool, after ergonomics-related keywords according to the definition of ergonomics were selected. And then, this study sorted out intellectual property rights searched by selection criteria, classified them in line with the purpose of this study, and suggested future development direction on the intellectual property rights in the field of ergonomics.

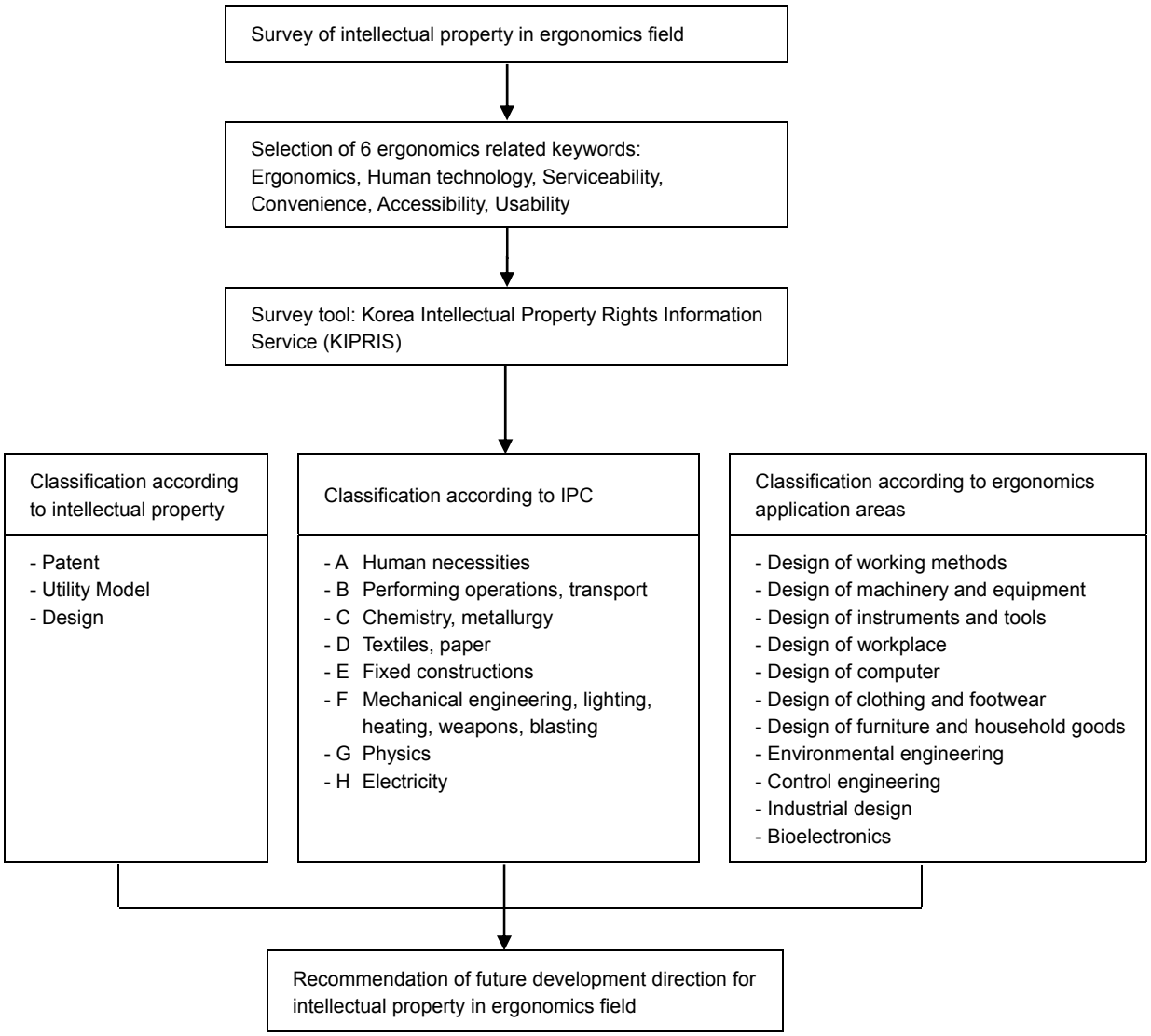

Figure 1. Flow chart of the research procedure

3. Results

3.1 Survey results of registration numbers of patents, utility models and designs in ergonomics field

Looking at the survey results to identify the registered patent, utility model and design rates in the field of ergonomics out of Korea's total registered patents, utility models and designs (Figure 2), it was surveyed that Korea's total registered patents, utility models and designs were 817,400 cases, and those in the ergonomics field were 48,814 cases, taking up 5.97% of the total registered patents, utility models and designs. As a Result of a survey on the registered patent rate in the detailed ergonomics field, total Korea's registered patents were 527,650 cases, and those in the field of ergonomics were 42,671 cases, which accounted for 8.09% among the Korea's total registered patents. In utility models, Korea's total registered utility models were 33,969, and those in the ergonomics field were 4,328, taking up 12.74% out of Korea's total registered utility models. Lastly, in designs, Korea's

total registered designs were 255,781, and those in the ergonomics field were 1,815, taking up 0.71% out of Korea's total registered designs.

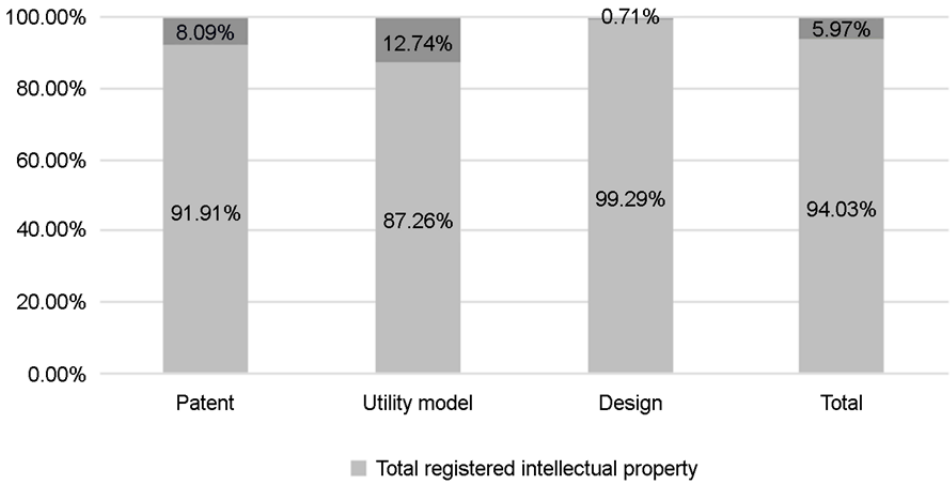

Figure 2. Total registered intellectual property rates for ergonomics field in Korea

As revealed in Table 1, the three types of registered intellectual property rights, namely, patents, utility models and designs in the economics field showed a steady increasing trend each year. As a result of annual rate analysis of total registered patents, utility models and designs in the ergonomics field, the patents, utility models and designs were 42,671 cases (87.42%), 4,328 cases (8.87%) and 1,815 cases (3.72%), respectively. It was grasped that the rate of patents was far higher than the other two. Yearly rate trend from 2005 through 2014, which is the common search period of patents, utility models and designs, showed similar tendency. The year, when the registered patent rate was the highest was 2007 (3,499 patents, 94.82%), and the reason was that the registered patents showed a steadily increasing trend, compared to previous year, but the registered utility models decreased in comparison with the previous year (505 utility models). The year, when the registered utility model rate was the highest was 2005 (286 utility models, 17.75%), and the reason was that the registered patents were relatively lower. The year, when the registered design rate was the highest was 2008 (4.55%), and the reason was that the registered patents decreased, and the registered utility models increased, compared to previous year; however, the decrease and increase were similar, and therefore, the registered design rate appeared to go up relatively. Meanwhile, the intellectual property right having the largest yearly rate fluctuation was utility model, and the lowest rate was 2.3% in 2007, and the highest rate was 17.75% in 2005. The reason seems that the registered utility models sharply fell in 2007, compared to other years.

Table 1. Result of registration numbers of patents, utility models, designs for ergonomics field

Year	Patent (%)	Utility model (%)	Design (%)	Total (%)
1996	–	–	–	–
1997	2 (–)	–	–	2 (–)
1998	57 (–)	–	–	57 (–)
1999	130 (–)	–	–	130 (–)

Table 1. Result of registration numbers of patents, utility models, designs for ergonomics field (Continued)

Year	Patent (%)	Utility model (%)	Design (%)	Total (%)
2000	112 (–)	–	1 (–)	113 (–)
2001	183 (–)	–	1 (–)	184 (–)
2002	306 (–)	–	13 (–)	319 (–)
2003	446 (–)	–	28 (–)	474 (–)
2004	707 (–)	–	47 (–)	754 (–)
2005	1,282 (79.58)	286 (17.75)	43 (2.67)	1,611 (100)
2006	2,934 (84.04)	505 (14.47)	52 (1.49)	3,491 (100)
2007	3,499 (94.82)	85 (2.3)	106 (2.87)	3,690 (100)
2008	2,541 (86.93)	249 (8.52)	133 (4.55)	2,923 (100)
2009	2,041 (85.11)	258 (10.76)	99 (4.13)	2,398 (100)
2010	2,934 (86.93)	319 (9.45)	122 (3.61)	3,375 (100)
2011	4,749 (85.52)	580 (10.44)	224 (4.03)	5,553 (100)
2012	5,887 (86.08)	681 (9.96)	271 (3.96)	6,839 (100)
2013	7,228 (87.91)	694 (8.44)	300 (3.65)	8,222 (100)
2014	7,633 (87.95)	671 (7.73)	375 (4.32)	8,679 (100)
Total	42,671 (87.42)	4,328 (8.87)	1,815 (3.72)	48,814 (100)

3.2 Analysis on IPC rates of patents and utility models in ergonomics field

Concerning the result of classifying the registration numbers of patents and utility models according to IPC (Table 2), the total registration numbers of the two intellectual property rights according to IPC was 54,879 cases. A-Human necessities took up the most with 11,114 cases and 20.25%, followed by H-Electricity (11,000 cases, 20.04%), G-Physics (10,545 cases, 19.22%), and B-Performing operations, transport (8,883 cases, 16.19%). As a result of an analysis to find out each rate of patents and utility models by IPC in detail, H-Electricity was the most with 5,836 cases and 33.55%, followed by G-Physics (4,813 cases, 27.67%), and A-Human necessities (2,724 cases, 15.66%) in the patents. Meanwhile, A-Human necessities were the most with 1,163 cases and 63.41%, followed by B-Performing operations, transport (257 cases, 14.01%), and H-Electricity (185 cases, 10.09%).

Table 2. Result of registration numbers of patents and utility models according to IPC

IPC	Patent (%)	Utility Model (%)	Total (%)
A - human necessities	9,213 (18.45)	1,901 (38.48)	11,114 (20.25)
B - performing operations, transport	7,875 (15.77)	1,008 (20.40)	8,883 (16.19)
C - chemistry, metallurgy	3,548 (7.10)	43 (0.87)	3,591 (6.54)
D - textiles, paper	759 (1.52)	64 (1.30)	823 (1.50)
E - fixed constructions	4,092 (8.19)	547 (11.07)	4,639 (8.45)

Table 2. Result of registration numbers of patents and utility models according to IPC (Continued)

IPC	Patent (%)	Utility Model (%)	Total (%)
F - mechanical engineering, lighting, heating, weapons, blasting	3,819 (7.65)	465 (9.41)	4,284 (7.81)
G - physics	10,133 (20.29)	412 (8.34)	10,545 (19.22)
H - electricity	10,500 (21.03)	500 (10.12)	11,000 (20.04)
Total	49,939 (100)	4,940 (100)	54,879 (100)

3.3 Analysis on rates of patents and utility models by ergonomics application area

Table 3 shows the registration numbers of patents and utility models by ergonomics application area, and the total number was 24,947. Of the total, patents were 23,735 cases, and utility models were 1,212 cases. As a result of an analysis on registration numbers and rates by ergonomics application area, the design of working methods was 10,564 cases (42.35%), and the design of machinery and equipment was 5,933 cases (23.76%), and environmental engineering was 2,117 cases (8.49%), in the order.

Table 3. Result of registration numbers of patents and utility models according to ergonomics application areas

Ergonomics application areas	Patent (%)	Utility Model (%)	Total (%)
Design of working methods	9,909 (41.75)	655 (54.04)	10,564 (42.35)
Design of machinery and equipment	5,647 (23.79)	286 (23.60)	5,933 (23.78)
Design of instruments and tools	1,268 (5.34)	96 (7.92)	1,364 (5.47)
Design of workplace	111 (0.47)	8 (0.66)	119 (0.48)
Design of computer	2,048 (8.64)	30 (2.48)	2,078 (8.33)
Design of clothing and footwear	165 (0.70)	11 (0.91)	176 (0.71)
Design of furniture and household goods	212 (0.89)	25 (2.06)	237 (0.95)
Environmental engineering	2,078 (8.76)	39 (3.22)	2,117 (8.49)
Control engineering	1,240 (5.22)	31 (2.56)	1,271 (5.09)
Industrial design	351 (1.48)	28 (2.31)	379 (1.52)
Bioelectronics	706 (2.97)	3 (0.25)	709 (2.84)
Total	23,735 (100)	1,212 (100)	24,947 (100)

As a result of identifying the rates by ergonomics application area in detail (Figure 3), the rate of working methods design was the highest at 41.75% (9,909 cases), followed by machinery and equipment design at 23.79% (5,647 cases), and environmental engineering at 8.76% (2,078 cases) in the order in patents. Working methods design took up 42.35% (655 cases), machinery and equipment design 23.60% (286 cases) and instruments and tools design 7.93% (96 cases) in the order in utility models.

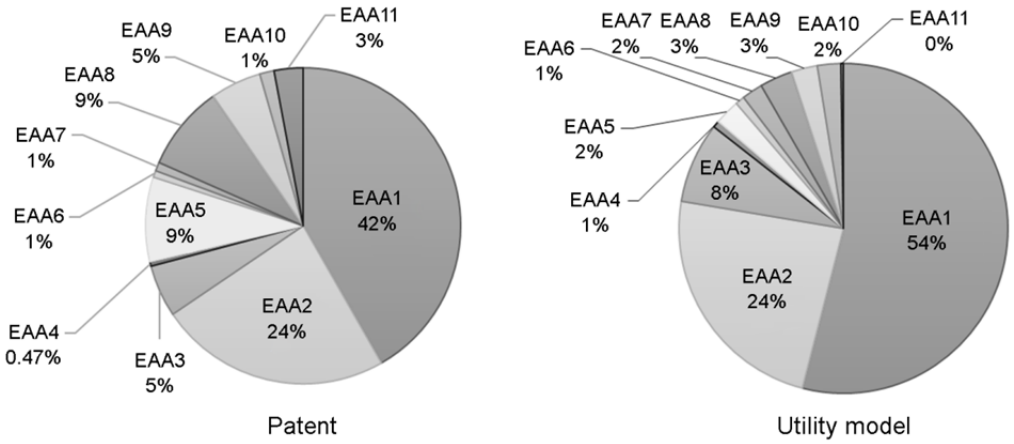

Figure 3. Registered rates of patents and utility models according to ergonomics application areas (EAA=ergonomics application areas; Table 3 should be referred to in terms of numbers)

3.4 Analysis on Korean design classification for designs in ergonomics field

As a result of examining the registration number of designs in the ergonomics field according to the Korean Design Classification, the registered designs were 1,892 (Table 4).

Table 4. Registration number of designs for ergonomics field

Code	Registration number (%)
A - food manufacture and item of personal preference	4 (0.21)
B - clothing and personal belongings	183 (9.67)
C - beddings, cooking utensils, household items	301 (15.91)
D - articles of housing equipment	263 (13.90)
E - recreational goods and athletic goods	45 (2.38)
F - office supplies and articles on sale, advertising tools	168 (8.88)
G - transport or conveying machinery	67 (3.54)
H - electrical and electronic equipment and apparatus and telecommunication devices	473 (25.00)
J - general machinery and implements	138 (7.29)
K - industrial machines and equipment	113 (5.97)
L - civil engineering and construction supplies	85 (4.49)
M - textile piece goods	52 (2.75)
N - not elsewhere specified goods	0 (0.00)
Total	1,892 (100)

As a result of an analysis on the rate of registered designs in detail (Figure 4), H-Electrical and electronic equipment and apparatus and telecommunication devices were the highest at 25% (473 cases), followed by C-Beddings, cooking utensils, household items at 15.91% (301 cases), and D-Articles of housing equipment 13.9% (263 cases).

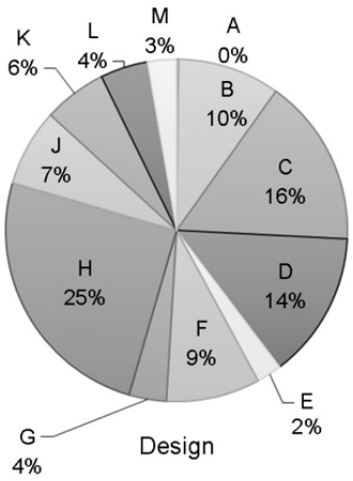

Figure 4. Registered rate of designs for ergonomics field (Table 4 should be referred to for specific alphabets)

4. Discussion & Conclusion

This study surveyed the registration status of patents, utility models and designs using KIPRIS, after extracting keywords by referring to the definitions of ergonomics defined by ergonomics academic societies and associations in order to examine Korea's intellectual property rights status in the field of ergonomics. This study has significance, because what research fields Korea's ergonomists focus on can be grasped through this study, and an opportunity exists to find out the areas to develop in the future by identifying the current situation of ergonomics. This study surveyed the yearly registration numbers of total patents, utility models and designs in the ergonomics field. Actually, the number of registered patents in 1996 was zero. The reason appears that KIPRIS commenced its commercial service in July 1996 (Korean Institute of Patent Information, 2015).

Meanwhile, it was found out the registration numbers of patents, utility models and designs commonly steadily increased each year, and then, showed a rapid increasing trend from 2010 to 2014. Such a result implies that the importance of intellectual property rights emerges to date, due to historic change through which intangible knowledge can be industrialized, as the information age is experienced. Among the registration rates of patents, utility models and designs, the registration rate of patents was overwhelmingly higher, followed by those of utility models and designs in the order, and such registration rates were similar each year. From the study results, very creative and advanced technologies were applied to most developed ergonomic designs to be extent that they are suitable for patent criteria. The similar phenomenon can be found in a study of Chung et al. (2014). According to their study, the ergonomics-related studies sharply increased from 2010 to 2014, compared to the past, and especially, increases in the vehicle and driving areas were remarkable. The study result of Chung et al. is conjectured to have close correlation with high registration rates in the sections of H-Electricity, G-Physics, and B-Performing operations, transport found out from the rate analysis by IPC in this study.

As for the registration rates of the patents, utility models in the ergonomics field, the rates in the sections of H-Electricity, G-

Physics, and A-Human necessities showed a higher trend. And, the rates in the sections of C-Chemistry, metallurgy, and D-Textiles, paper showed a lower trend. This may imply that past developed products in the chemistry, textile and paper areas cannot developer furthermore. Such a trend is not limited to Korea. According to the data of WIPO (World Intellectual Property Organization) (Figure 5), the registration numbers in the sections of H-Electricity, G-Physics, and B-Performing operations, transportation were quite many in 2015, and the numbers showed an uptrend over time. Meanwhile, the registration numbers in the sections of C-Chemistry, metallurgy, A-Human necessities, and D-Textiles and paper were low (World Intellectual Property Organization, 2015).

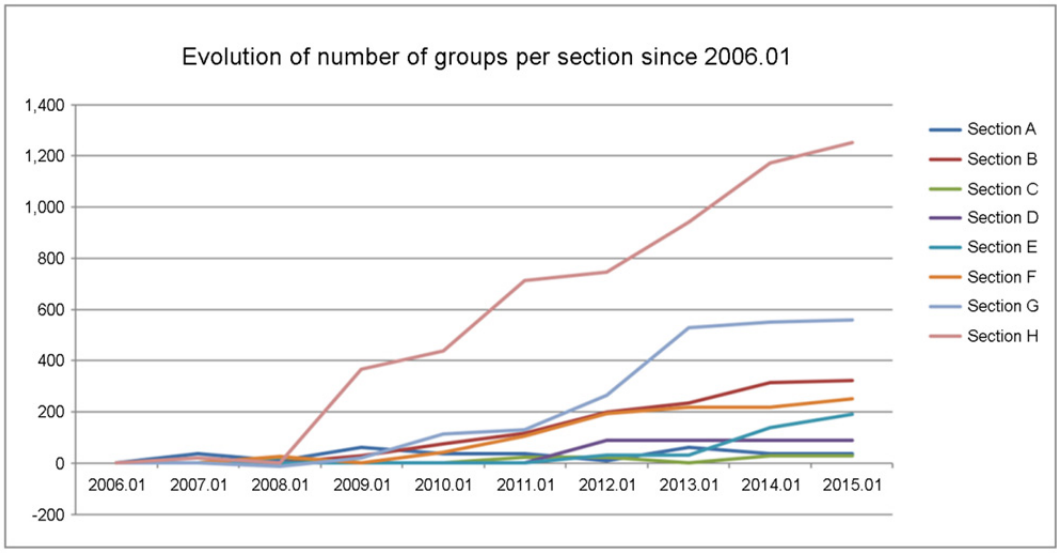

Figure 5. Evolution of group numbers per section since January 2006 (World Intellectual Property Organization, 2015; Section code should be refer to Table 4)

As for the similarity with the IPC registration numbers identified in this study was that the rates in the sections of H-Electricity, and G-Physics were high, and the rates in the sections of C-Chemistry, metallurgy, D-Textiles, paper were low. However, there was a difference in that the rates of the section A-Human necessities in this study were relatively higher than those of WIPO. There was also a difference in that the rates in the section of H-Electricity researched by WIPO were far higher than the result in this study. Therefore, the future development direction of Korea's ergonomics field seems to need constant R&D in the section of H-Electricity in line with global trend, and the development in the sections of C-Chemistry, metallurgy, and D-Textiles, paper is considered urgent. In the analysis of rates by ergonomics application area, much high rates in the design of working methods in patents and utility models seem that the development in one area is overly concentrated. To enhance human's convenience and quality of life, it is judged that each ergonomics application area needs to evenly develop, and therefore, R&D in the alienated areas is hoped to be carried out.

This study surveyed the registration rate of the designs using the Korean Design Classification, which was not attempted in other studies. The registration rates were highest in the sections of H-Electrical and electronic equipment and apparatus and telecommunication devices, C-Beddings, cooking utensils, household items, and D-Articles of housing equipment in the order. The reason is conjectured that the popularization of smartphones from early 2010, and the development of information and communications industry affected the most. The development of smartphones and information and communications industries

has advanced the ubiquitous era, and the smartphones have become popularized to the extent that men and women of all ages use them. In this regard, the designs of cooking utensils or articles of housing equipment related to more convenient apparatus emerged in line with the public's needs. Good examples can be a technology starting a car with a smartphone using the Internet of Things (IoT), and a technology controlling heating facility at home with a smartphone, when one is away from home. In consideration of such correlations, modern people are mainly interested in the information and communications area, but the registration status of intellectual property rights is implied to change according to the public's interest areas.

This study used a search method using the limited keywords related with ergonomics. Because, the application a reas of ergonomics is as wide as the diversity of human needs, there can be some hardship to generalize intellectual property rights in the entire ergonomics field with just several keywords. In this context, this study proposes extracting intellectual property rights and identifying their status according to the broader definition of ergonomics in order to enhance the validity of research in future studies.

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