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INVESTIGATING THE NUMBERING OF TECHNICAL MAPS AND NUMBERING OF PARTS IN THE WORLD AIR INDUSTRY - PROVIDING A NATIVE MODEL FOR IRAN'S AIR INDUSTRY AND GENERALIZING IT TO OTHER INDUSTRIES

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Abstract:
In recent years, Iran's domestic air companies, which have been involved in aircraft repair, have been designing and manufacturing various types of bird products by establishing design offices and technology development centers. An important issue is the lack of a comprehensive and standardized system used in the country's air industry. The main objective of this research is to review the numbering systems of technical drawings and numbering of parts in the world air industry and provide a native model for the Iranian airline industry. The purpose of this research is in the field of applied research, and field methods such as questionnaires have been used. The statistical society of the design and manufacture of bird equipment is at the level of the airline industry in Iran. The Delphi method has been used to examine and conclude the proposed model. Based on the results of the implementation of the numbering system, it is possible to systematize the process of designing and constructing an aircraft, and as a result, it facilitates the coordination between the design unit and the units of construction and repair, and due to reduced design errors and structural defects in sets and parts of the product It improves the quality and reduces costs in the company, and subsequently improves the reliability of the aircraft and profitability of the company. It

is suggested that executive instructions and the processes for mapping and subscribing to the organizations at stake level be developed.

Keywords: technical map numbering, parts numbering, world aircraft industry

1. Introduction

In order to produce a product with advanced technology, the first step is to research and design the product. In the aerospace industry, all of its products come with the most sophisticated technologies in the world today; there is a product of the air consisting of many systems and sub-systems, each of which consists of several pieces. Due to these top-notch technologies, the design, assembly and assembly processes also have particular complexity in these products, therefore, to make it easier to identify these processes and parts, and to create order in the design and production of products, and provide standard methods for the communication between these components and parts require a standardized system of numbering maps and components. From the infrastructure of the air industry to design and manufacture new bird products, the creation of specialized design offices in various fields of the air industry, including airplanes (military, commercial, unmanned, etc.), helicopters and air engines, is one of the most important sectors these R & D offices or research and development centers or product design offices are a standardized research documentation system that will begin to be developed and commercialized by the completion of the research and its outcome. One of the most basic parts of this documentation is a technical map that should be numbered in a regular and accounted way so that it can easily be used at different stages of design and production, and there is a special connection between the map number and the part number so that it can easily be found in the production stages, assembling, repairing and maintenance of the equipment, and it can be used quickly and easily. Therefore, the comprehensive system of numbering of technical drawings and parts in industrial production is of great importance. Knowledge and technology are broadly important for the growth and competitiveness of different industries and the overall growth of national economy. In fact, economic growth is increasingly dependent on knowledge, technology and other knowledge-based assets. The policy makers of developed and developing countries are trying to attract, educate and maintain knowledge-based companies (Shahnazi, 1391). The purpose of the study is to examine the systems for the numbering of technical drawings and numbering of

parts in the world air industry and provide a native model for Iran's aerospace industry and generalizing it to other industries.

2. Theoretical Background of the Research

Following the development of the country's chain of stores for the use of bar codes, it was commissioned in the year 74 by the Ministry of Commerce to establish the National Center for Product and Product Characteristics for service in the field of barcodes, as well as education, culture and international coordination. The National Center for Product and Service Numbering has served as GS1 International Representative since 74 years and has followed GS1 missions. The activity of the center until the year 84 was merely the development of a GTIN or 13-digit code. Then, from the year 84, the code was introduced and its design began. The background of the Iran-Khodro system is related to the 15-year experiences of classification and coding activities in the defense sector of the country. In the logistics of this sector, a system called Samapel (Logistics Base Information Management System) was designed and implemented with valuable experience in its implementation. So a team of Samapel managers and experts was based at the National Center for National Product and Service Dialogue to apply these experiences to the design of Iranian code at the national level. Thus, Iran Cod was designed as a set of information, information standards, processes, operational network, software packages and products to be supplied with information to respond to part of the information needs of stakeholders in information products and services in the country. In fact, the IRC has received data and basic information from current suppliers of goods and services on the national level from the suppliers and, using its standards, provides the information to the stakeholders (Center for the Evaluation of Human Resources and Services of Iran, 2007).

Over the past two decades, technological growth, especially new technologies, has been a major factor in the integration of markets and the process of globalization (Cetindamar, Phaal, & Probert, 2009). Technology in the economic sense is a product based on research and development based on knowledge and development, commercially tradable in a market with specific features as a product whose price is determined by the interaction of supply and demand (Zhao, Tong, Wong, & Zhu, 2005). Technology capability, which is the centerpiece of the competitiveness of global class enterprises, has two aspects of technology production and technology. Achieving the ability to research, develop and expand it is an important element for the growth and diffusion of technology and access to technology maturity (Blalock & Gertler, 2009).

3. The Necessity of Developing and Extending the Coding System

1. Identify the same items in all components of the supply chain by assigning only one name and code to each item. Due to the wide variety and variety of goods and services at the national level, members of the supply chain use different names and codes to introduce a product. They do. The reason for this is the difference between the level of education and the general culture and the importance of this issue for the chain members. This causes the chain to be mistaken in exchanging information about the goods, and it is possible that these mistakes make irreparable losses to national interests.
2. Dividing the goods into a number of groups, and dividing each group into smaller hands, so that the same items are in the controllable categories. This makes it possible for private firms and government agencies associated with each commodity to know each other more effectively and communicate with one another.
3. Creating a standard language for relations between members of the supply chain using the standard dictionary of terms and codes. Distributors, purchasers of raw materials and consumer goods manufacturers are purchasers of middleware and parts. If all members of the chain are required to use the product code in interactions, a common language is created between the components of the system, whereby the information of the goods and services will flow more efficiently throughout the chain and will not cause any wrong communication. Came. So the introduction is the creation of standard language, the classification and coding of goods, and the presentation of standard definitions of items and categories of goods.
4. Creating a reliable and correct information base for the government. Undoubtedly, information is the most effective government oversight and control tool. The importance of information is so high that today it is considered as the first factor for national planning and development. In the area of goods, data can be helped by regulating regular goods and creating an appropriate information system, helping the government to carry out its duties related to goods.
5. Providing the possibility of electronic data processing and installation of mechanized systems. Existence of massive amounts of information in the present day requires speeding up their processing. Hardware, hardware, and software that performs data and data processing today when they succeed in providing

data with numbers and figures. Introducing data with numbers simplifies the process of processing them and reduces the chance of mistakes. The numbers that represent the product data are the same code.

6. To reveal the nature of all items in a proper structure and to reflect the technical knowledge of items among users. In many designs, the coding of goods and services is based on the nature and type of the product, and the code is assigned to it. Each category of these items is distinct from the other, and the characterization of the nature of the items in the classification structure provides a kind of technical knowledge about the items that can be used by the institutions that need this knowledge (Gholamzadeh, 1998).

4. Coding

Today, coding systems are fundamental elements of the business process. These systems link organizations beyond geographic and cultural boundaries, enabling the use of powerful information leverage to improve the lives of people everywhere in the world. Standard coding systems have developed a single approach to product identification and access and sharing of information through the supply chain. Currently, many companies around the world have increased the transparency of their supply chain by using coding systems (GS, 2013). To order information categories, their proper naming and the ease of retrieval and access to them whenever necessary, all information is compared and the same from the perspective of the user, and for each category of information a name or Symbol (letter, numeric, letter-to-numeric, etc.) is considered. Encrypt this process or encrypt the information. The purpose of coding goods and services is the process of identifying, classifying, and defining the code for goods and services. Identification involves collecting information and analyzing them in order to understand the item's pen. Classification means organizing information derived from identifying activities based on their characteristics, and eventually coding means coding information for categorized goods information in the form of symbols, numbers, and signs (Gholamzadeh, 1998).

4.1 United Nations Standard Goods and Services Coding System[i]

The United Nations Standard Goods and Services Code is an open standard in global e-commerce that provides a rational framework for categorizing goods and services. In

[i] The United Nations Standard Products and Services Code (UNSPSC)

1998, a collaborative team of analysts and researchers at Don & Barthostright[ii] and the Intermediary Purchasing Services Organization (IAPSO) joined the United Nations Common Coding System (UNCCS), the Standardized Goods and Services Coding System of the United States Code of Commodities and Services (UNSPSC) through development. Subsequently, the information security assurances and the common use of names, groups, and definitions of industry experts were made and finally the general coding was completed through public and commercial documents first discovered in public libraries and the Internet.

4.2 Classification and International Standard System Classification and Description of Products and Services

Classification is a method that organizes information in a systematic and logical order, and places similar information in a distinct category of other information (Gholamzadeh, 1998). The eCl @ ss system is the international standard for the same classification and unit of products, materials and services throughout the supply chain, which has been managed and developed by the non-profit eCl @ ss since 2000. In addition to providing the option of describing each individual product in a unique way, this standard also allows the grouping of products and the company's internal organization system based on the product group product characteristics. The eCl @ ss standard has since been used by many companies and institutions as a product group structure. In other words, eCl @ ss is considered as a normative[iii] standard for all industries that integrates industry-specific classification solutions. Standard eCl @ ss custodians also work with other standardizing organizations active at national or international level (Electribarzadeh, 2011).

4.3 NATO coding system[iv]

The NATO codification system is based on the US federal catalog system and civilian organizations use some NATO members. The management of the system is also the responsibility of the National Directorate's National Bureau of Coding[v], and its implementation in the member states is the responsibility of national coding offices[vi] in each country. Establishment, implementation and maintenance of the NATO codification system, a common language for use in national activities (such as supply

[ii] Dun & Bradstreet (D&B)
[iii] NORM BASED
[iv] NATO Codification System (NCS)
[v] NATO Group of National Directors on Codification (AC/135)
[vi] National Codification Bureau (NCB)

chain management, standardization, etc.) and between NATO member states and non-members.

Establishment, implementation and maintenance of the NATO codification system, a common language for use in national activities (such as supply chain management, standardization, etc.) and between NATO member states and non-members. In this system, the responsibility of encoding each item of supply is with the country designing the item, even if that country does not use that item. The country that buys and uses that font must also act on the basis of its country code designer (NATO, 2014).

4.4 ISIC structure

In this system, first all economic activities are divided into the main parts of the standard, then all activities fall into their category, group and class. The criteria for this classification include (1) the characteristics of goods and services produced, (2) the use of goods and services, and (3) inputs, processes, and production technology (ISIC, 2008).

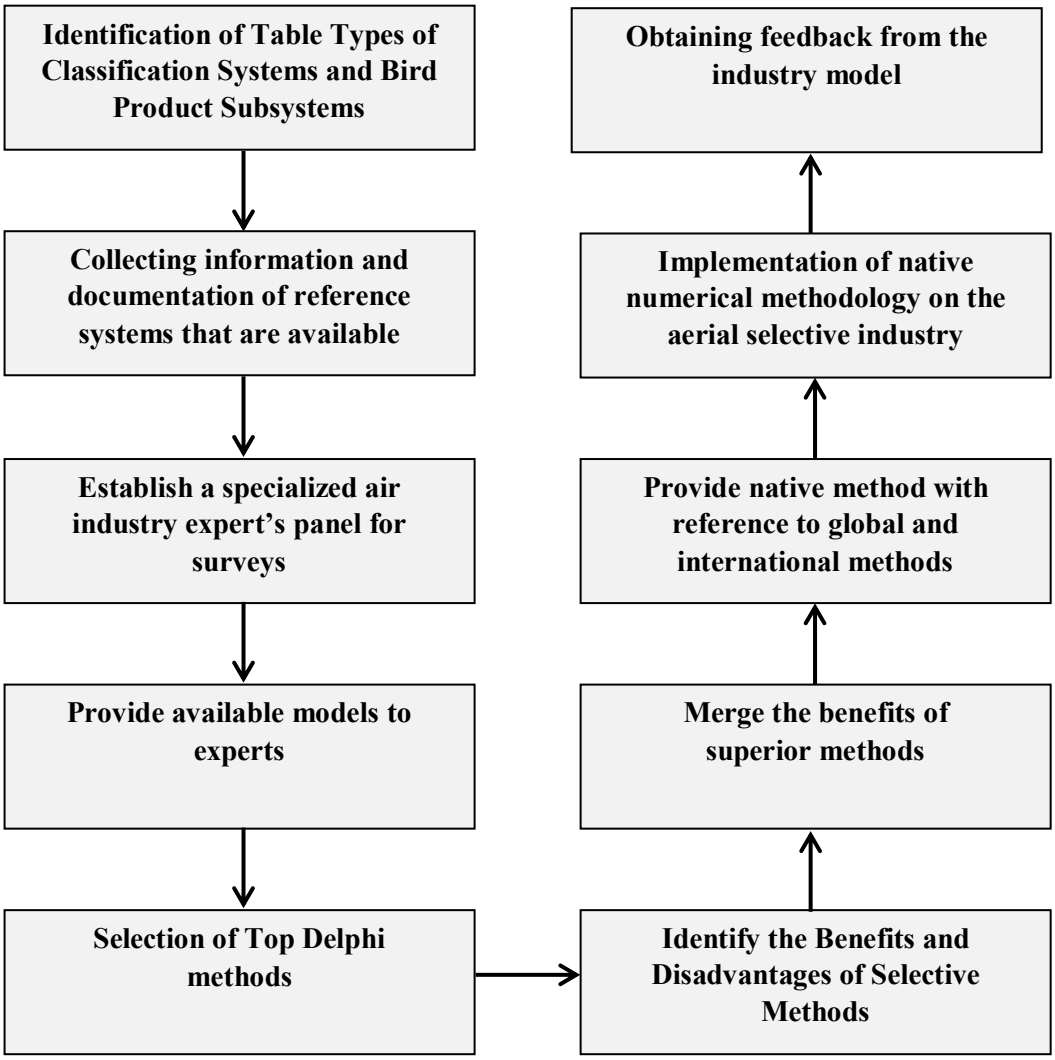
4.5 Product-based classification

Since the early 1970s, with the United Nations Commission on Statistics and other international organizations, such as the European Communities Statistics Office, an attempt has been made to achieve a system consistent with ISIC in classifying goods and services. As a result of this effort, version 1 of this standard was released in 1998 and its version 1.1 was released in 2002. The purpose of the CPC is to create a framework for comparing statistics of goods and services internationally (ISIC Rev.3.1, 2002).

5. Research questions

1. How are the technical documents and designs of the bird equipment designed to be numbered?
2. What are the principles of numbering maps?
3. What should be the relationship between the number of parts and the number of drawings?
4. How should the relationship between the numbers of different parts of a set be?

Figure 1: Suggested research model



6. Research Methodology

The purpose of this research is in the field of applied research, and on the other hand, considering that in this research, the methods of library study (technical books of aircraft, international standards and instructions of aircraft manufacturing companies) and field methods such as questionnaires have been used, The present research is based on the nature and method of data collection. A descriptive study is used. The statistical community is designing and constructing bird facilities at the level of the airline industry in Iran. The Delphi method is used to examine and conclude the proposed model. Then, by generalizing, the proposed method in this is the end the results can be exploited in all other industries of the country.

6.1 Analyze

A. The results of the first questionnaire among the members of the specialized boards in the Table 1. The two columns of each middle question and the average answers of the experts have been calculated. The results of the review are 23 questionnaires. Based on the consensus principle, according to the experts of the industry, the following results were obtained:

1. In all parts of the aeronautical industry, there is a great need to use the map number and part number.
2. In the design of aeronautical parts and engineering departments, the construction and assembly of these products requires a lot to allocate the map number and the part number.
3. There is a comprehensive numbering system in these sections.
4. All sections of their systems are used to do dialing. These systems are not part of the comprehensiveness and coherence necessary to communicate with other sectors, and the structure of assigned numbers is not fully and conceptually standard.
5. The experts of all departments, in view of their sector strategy and ongoing projects and future projects, are required to develop and implement a comprehensive system for the numbering of technical documents and parts of aerial parts.

Table 1: First questionnaire

Results after removing parts of the repair department that do not interfere with the numbering			Results			Questions	Line
			Facade	Average	Sum of points		
Facade	Average	Sum of points	5	4.7	107	Do you need to use part number in your section?	1
			5	4.7	107	Do you need to use the map number in your section?	2
5	4.9	79	1	3.7	86	Do you need to assign numbers to new maps in your section?	3
5	4.9	79	1	3.7	86	Do you need to assign numbers to new parts in your section?	4
1	1.0	16	1	1.0	23	Does your organization have a comprehensive and standardized numbering system for maps and components?	5
3	3.1	50	1	2.5	57	Is there a dedicated (dedicated) numbering system for your plan and parts?	6
2	1.9	31	1	1.7	38	The system numbering part of the map and the components of the organization's full need?	7
2	1.8	28	1	1.5	35	Is it possible to coordinate between different parts of this system?	8
2	1.7	27	1	1.5	34	Are the numbers assigned to the map and parts in the part numbering system meaningful? (I.e., through this number, the type of system and its location can be detected?)	9
			5	4.6	106	Considering your organization's strategy for present and future projects, you need to develop a comprehensive mapping and mapping system?	10

B. The results obtained from the second questionnaire in Table (2), according to the average scores of each index and the calculation of its weight relative to other indicators. Priority and weight the importance of each of the indicators was extracted as follows:

1. Comprehensive classification system (weight 0.31);
2. The conceptual nature of the number structure (weight 0.27);
3. Simple structure the technical number (weight 0.19);
4. Comprehensiveness to new systems (weighs 0.12).

5. Availability of documents by classification method (weight 0.11)

Table 2: The second questionnaire

Weight priority indicators	Results		Questions	Line
	Average	Sum of points		
0.31	**4.70**	**108**	Comprehensive means all bird equipment, systems and sub-systems	**1**
0.27	**4.09**	**94**	It means that the number can be identified by the type of bird, system and substandard.	**2**
0.12	**1.74**	**40**	It can be used to assign numbers to new systems.	**3**
0.19	**2.83**	**65**	The number structure is simple and easy.	**4**
0.11	**1.65**	**38**	The classification system for systems and subnets is fully available.	**5**
1	Weighing weight			

C. The results of the third questionnaire in Table (3) with the prioritization and weight of each of the indicators in the second questionnaire. In the third stage, the information of the three methods of classification in the air industry of the world that were presented in this study was provided to the member experts The specialized boards have agreed to answer the questions of the third questionnaire on the basis of these characteristics and this information. The results of these responses are listed in Table (3).

To approach the consensus as well as a re-examination of the same question, we submitted the third questionnaire at another time (about 20 days later), along with the statistical results obtained from it to the specialized board, and we asked the fourth questionnaire to answer the questions again.

Table 3: Third Questionnaire

Results				Questions	Line
Ultimate Score	Score averages	Preference weight	average score		
2.91	0.99	0.31	3.2	Do you know Northrop's classification system comprehensive?	1
	0.79	0.27	2.9	Do you know Northrop's classification system as a concept?	2
	0.23	0.12	2.0	Do you know the Northrop company classification system as a new system?	3
	0.14	0.11	1.3	Is there access to the full table of Northrop's classification system?	4
	0.75	0.19	4.0	Do you know the technical details of the Northrop company?	5
2.62	0.86	0.31	2.7	Do you consider Bell's helicopter classification system comprehensive?	6
	0.75	0.27	2.7	Do you consider the classification system of Bell Helicopter to be a concept?	7
	0.23	0.12	2.0	Do you consider the Bell Helicopter classification system to be new to new systems?	8
	0.36	0.11	3.3	Is there access to the full table of the Bell Helicopter classification system?	9
	0.42	0.19	2.2	Do you know the technical details of Bell Helicopter Company?	10
4.04	1.44	0.31	4.6	Do you consider the standard ATA-100 standard classification system comprehensive?	11
	1.36	0.27	5.0	Do you know the ATA-100 standard classification system?	12
	0.53	0.12	4.6	Do you know the ATA-100 standard classification system as a new feature?	13
	0.52	0.11	4.7	Is there access to the full table of the ATA-100 standard classification system?	14
	0.19	0.19	1.0	Do you know the technical details of the ATA-100 standard?	15

D. The results of the fourth questionnaire in Table 4, according to the final scores of the three methods presented in the third and fourth questionnaires and their comparison, indicate that the difference in the score of responses in the third and fourth questionnaire is about one percent. The results of this questionnaire the following are achieved:

1. The ATA-100 classification method with a score of 4.11 in the fourth questionnaire and a score of 4.04 in the third questionnaire is the best method from the viewpoint of experts in the members of the specialized boards.

2. The Northrop Trophy Numbering System is the best structure for experts in the members of the expert panels.

Based on the consensus opinion of the Delphi method, the proposed model of the numerical system of this thesis is the standard ATA-100 classification system, which is categorized as a system of systems and subsurface products and a number structure similar to the structure of the Northrop Company. In this new model, the benefits of both We will use these methods.

Table 4: Questionnaire Four

Results				Questions	Line
Ultimate Score	Scoring points	Preference weight	average score		
2.87	0.95	0.31	3.0	Do you know Northrop's comprehensive classification system?	1
	0.79	0.27	2.9	Do you know Northrop's classification system as a concept?	2
	0.23	0.12	2.0	Do you know Northrop's classification system as a new system?	3
	0.14	0.11	1.3	Is there access to the full table of Northrop's classification system?	4
	0.75	0.19	4.0	Do you know the technical details of the Northrop company?	5
2.59	0.83	0.31	2.7	Do you consider Bell's helicopter classification system comprehensive?	6
	0.75	0.27	2.7	Do you consider the classification system of Bell Helicopter to be a concept?	7
	0.23	0.12	2.0	Do you consider the Bell Helicopter classification system to be new to new systems?	8
	0.36	0.11	3.3	Is there access to the full table of the Bell Helicopter classification system?	9
	0.42	0.19	2.2	Do you know the technical details of Bell Helicopter Company?	10
4.11	1.48	0.31	4.7	Do you consider the standard ATA-100 standard classification system comprehensive?	11
	1.36	0.27	5.0	Do you know the ATA-100 standard classification system?	12
	0.55	0.12	4.7	Do you know the ATA-100 standard classification system as a new feature?	13
	0.52	0.11	4.7	Is there access to the full table of the ATA-100 standard classification system?	14
	0.19	0.19	1.0	Do you know the technical details of the ATA-100 standard?	15

7. Conclusion

Based on the research carried out, it can be concluded that the implementation of this numbering system will streamline the design and construction of an aircraft and, as a result, facilitates the coordination between the design unit and the units of construction and repair, and due to reduced errors Design and fabrication bugs in product collections and parts enhance the quality and reduce costs in the company, and subsequently enhance the reliability of the aircraft and profitability of the company. It is suggested that the executive instructions and processes of the system for the numbering of maps and components be developed at the level of the organizations concerned, and the tasks of each of the levels of the organization should be defined in relation to the correct and complete implementation of the numbering system in order to better implement this system and achieve its objectives.

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