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AN OUTLINE OF SECTORAL QUALIFICATIONS FRAMEWORK IN AVIATION INDUSTRY

ABSTRACT

Aviation industry is a complex industry in which significant technological progress has been made. Huge demands are placed on experts working in aviation industry and therefore their responsibilities are great. Educational system should be created in a way to serve aviation industry and to predict further developments in the industry, and not only to be in line with the contemporary needs and requirements. This paper gives an outline of general structure and Sectoral Qualifications Framework in aviation industry based on current key competences and qualifications. An overview of aviation market is also presented in relation to future job requirements. Categories of qualifications in the sector are to be further analysed in terms of required knowledge, skills, and key competences.

KEY WORDS

aviation industry; sectoral qualifications; framework; competences

1. INTRODUCTION

The relevance of education is of utmost importance for all segments of society. The question is just how important is it? Newcomer et al. [1] found that aviation managers consider education important for hiring new staff, even though they did not share the same opinion regarding their own employment. Such an attitude indicates a potential paradigm shift in aviation industry, from an opinion that education is not preferred, towards an attitude that education is an imperative [1]. Smith et al. [2] found that in the course of pilot training, candidates who completed higher education need less practical training than those who did not. The importance of education in aviation industry recruiting should also be observed in the context of certification and experience that an individual hold. The research carried out on this topic [3] showed that education is a field of constant and considerable importance and is extremely significant for employers. It appears to be the only field with constant positive trends.

However, the greatest importance is placed on individual's experience. It has been shown that, if a particular job is of a more technical nature, employers will require persons who hold certain certificates. If a job is more about management and involves communication and other soft skills, then employers will look for experienced and educated individuals. The current research has shown that experience is the most relevant issue for performing a job and for delivering skill, knowledge and ability (in that order) and is accordingly vital to the aviation industry hiring process [3]. Education is

on one hand considered to be important, but on the other hand it solely serves as a foundation upon which the experience is built.

This paper elaborates on the sector called aviation industry. It discusses trends in aviation industry and establishes a link between international sectoral qualifications frameworks and sectors. The key competences of the sector are detected; but still they need to be further developed and elaborated.

2. AVIATION INDUSTRY MARKET

Air traffic is expected to grow in the long-term. New concepts and technologies that have emerged over the last six years enabled implementation of free routes or point-to-point flying using advanced on-board avionics. According to 2016 report on air traffic market [4] airlines globally achieved record profitability in 2015 with operating margins of at all-time high of 8.8%, while average air fares decreased by 5% against a backdrop of fuel prices averaging 44% lower than in 2014. All the above mentioned was in favor of the fact that the number of passengers carried (revenue passenger kilometer – RPK) grew by 6.3% in 2016, in comparison to 2015. This gives a number of 3.7 billion passengers carried by air in 2016. The International Air Transport Association (IATA) expects 7.2 billion passengers to travel in 2035, which means that the number of passengers will be doubled compared to 2016. With the strong and resilient passenger traffic growth, and the fact that air traffic doubles every 15 years, there is a great need for new aircraft. In 2016, there were 19,000 passenger aircraft in service. Airbus predicts a demand for 34,900 new aircraft by 2036 (34,170 passenger and 730 freight aircraft) [5]. Asia pacific region should account for 41% of the demand, with the US and Europe together representing 36%.

As the world fleet grows, grows also the need for pilots and technicians to meet the demands of airlines and passengers. Airbus forecasts that over the next 20 years, more than a million aviation industry professionals will have to be trained to the fullest possible extent [5]. It is predicted that only European companies will need to hire 106,000 pilots and 111,000 technicians between 2017 and 2035 [6]. The prediction of total demands for aviation professionals according to world regions is presented in table 1.

Table 1 – Prediction of total demand for aviation professionals according to world regions

World region	Demand for commercial airline pilots	Demand for airline technicians	Demand for commercial airline cabin crew
Asia Pacific	253,000	256,000	308,000
Europe	117,000	118,000	173,000
North America	106,000	111,000	154,000
Middle East	63,000	66,000	96,000
Latin America	52,000	49,000	52,000
C.I.S./Russia	24,000	25,000	28,000
Africa	22,000	23,000	28,000
TOTAL	637,000	648,000	839,000

Source: [6]

The demand for pilots is influenced by retirement of experienced pilots, by a large number of inexperienced pilots that enter the service and by the fact that army is no longer the primary source of airline pilots.

A shortage of workforce in maintenance technician field was identified by 42% and presents the greatest challenge in aviation [7]. It is predicted that a global demand for qualified aviation experts will take place in the next 15 to 20 years.

In the future, a digital transition will cause a re-evolution of traditional MRO practice. Today, new generation aircraft are able to communicate in real time through datalink systems up to 400,000 separate parameters, enabling predictive maintenance to begin to play a key role in aircraft operation and support.

If we want to design educational system or training programs for air transport and aviation experts and other jobs in the sector that encompasses aviation in general (also known as Sectoral Qualifications Framework), firstly we have to understand what qualification is. Secondly, the most important and challenging objective is to predict what aviation industry and air transport will look like 20 years from now.

3. INTERNATIONAL SECTORAL QUALIFICATIONS FRAMEWORKS AND SYSTEMS

International sectoral initiatives are widespread phenomena. The Final Report on Sectoral Qualifications Frameworks (SQF), commissioned to support European Commission in recognition of International Sector Qualifications (ISQ) and related initiatives, identified 254 organizations delivering SQF initiatives, of which several managed more than one. Most were qualifications, suites of qualifications, or standards [8].

The integration of International Sectoral Qualification is a key objective of European Qualification Framework (EQF) which should enable international organizations to relate their qualifications systems to a common European reference point and thus show the relationship between international sectoral qualifications and national qualifications. EQF is also an instrument for the promotion of lifelong learning, so it encompasses all levels of qualifications acquired in general, vocational as well as academic education and training.

Qualification is a formal outcome of an assessment and validation process which is obtained when complement body determines that an individual has achieved learning outcomes to given standards [9]. The EQF's eight reference levels define all levels of qualifications, from basic general knowledge (level 1) to doctorates (level 8). All EQF's levels are described in terms of leaning outcomes, while the levels 3-5 are reserved for vocational education and levels 6-8 for an academic degree.

Learning outcomes are statements used to describe what a learner knows, understands and is able of doing after the completion of a learning process. Learning outcomes are specified in three categories – knowledge, skills and competences [9].

European Member States have been invited to align their national qualifications levels with the EQF. But EQF Recommendation [10] does not include definition of International Sectoral Qualifications Framework and it does not elaborate on how such relationship shall be established. The EQF Recommendation refers to a linkage between EQF and sectoral qualification systems, however there is very little clarity about what is meant by this term. The EQF basically translates qualifications acquired with the different education and training system in Europe more readable and understandable.

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The study [8] detected that, so far, there has been little concrete action to clarify the role of EQF in support of IQF. Most ISQ initiatives target at highly skilled professionals. They are top-up qualifications, mainly designed for professionals who already hold an initial qualification. Hence, the most common purpose for the initiatives is to facilitate the movement of professionals across countries and secure and/or raise professional standards. One of important conclusion of the study [8] was that the most commonly mentioned reason for having or wanting to create a link with IQF and EQF is to improve recognition.

3.1 What is Sectoral Qualification Framework?

Hupfer and Spöttl [11] state that a sector related qualification framework, or sectoral framework in short, includes qualifications and competences (learning outcomes) that are relevant in a specific economic sector. Further to that, what is a sector and how to define it? The above mentioned authors define a sector (from the point of view of vocational education) as an area of expertise that relates to comparable or similar work tasks and work processes and has a similar production or service structure. Based on economic nature of a sector, it can be considered as a Single European Market which refers to the EU as one territory without international boundaries or other regulatory obstacles to the free movement of goods and services. In relation to that, EU defined 22 sectors, out of which Aeronautical industry is one.

A distinction between aeronautics industry and aviation industry should be noted. European aeronautics industry develops and manufactures civil and military aircraft, helicopters, drones, aero-engines and other systems and equipment. The industry includes companies that provide support services, such as maintenance and training. In this concept, term aeronautical is strictly focused on production.

On the other hand, term aviation is more general term which can be more appropriate for definition of specific sectoral framework. Aviation is the activity of flying aircraft, or designing, producing, and keeping them in good condition. It is convenient to use more general term aviation instead of aeronautics together with the term industry to emphasize the importance of economic perspective to be consistent with EU sector definition. Therefore, it is proposed that in that specific sector is called aviation industry and the future framework Sectoral Qualifications Framework for Aviation industry.

3.2 What is the framework?

In addressing the problem of attempting to explain the nature and meaning of SQF, the understanding of framework can be crucial. There are two groups of frameworks that can be distinguished [11]: frameworks whose descriptors reflect merely market-oriented requirements and employers' perspective, and frameworks whose descriptors include additional claims to education that go beyond a partial market perspective.

The employability model aims at an output oriented or learning outcome-oriented description of qualifications, irrespectively of the pathways, models and systems of qualification for the labour market.

Understanding the model of qualification is essential for generating qualification framework. In vocational education model qualification for the labour market is below the level of higher education and is traditionally input oriented. EQF qualification structure follows the model of market-oriented employability. EQF descriptors are in principle inadequate for representing qualifications that are achieved in the system of dual vocational education and training. This is likely to be an obstacle to the successful implementation of the EQF, especially in those countries that have elaborate system of vocational education. Anglo-Saxon concept of employability became the reference model for the EQF and number of other national frameworks, whose design in terms of the concept of qualification and the descriptors used, follow the EQF [11].

In this sense, a problem of education or practical training of air traffic controllers (ATCOs) can be considered. The question is whether the employer, the Air Navigation Service Provider, needs their ATCOs to be engineers with university bachelor diploma, or is it more appropriate for them – considering job description which is mainly skill oriented - to be high school graduates with intensive specifically designed training? The supporters of the second option argue that 90% of university education program is unnecessary (too much natural sciences, etc.) and therefore needless. So, three-year (bachelor) university program for ATCO is a waste of time, after which ATCO candidates anyway have to complete additional courses to gain their licenses. The supporters of the first stand (ATCOs as engineers), argue that the complex Air Traffic Management system does not only need highly trained professionals, but also such experts who will actively contribute in designing the system and adapting it to the needs of the employer. That includes highly specialized knowledge of the field, problem-solving skills and critical awareness of knowledge. These are the exactly the same knowledge and skills mentioned in descriptors of EQF level 7 which corresponds with European Higher Education Area and framework of Bologna process. The truth is probably somewhere in the middle. Some candidates should be trained as career ATCOs, and others to be experts in the field of ATM with engineering background and practical experience. The same problem arises when education of professional or commercial pilots is discussed.

3.3 What is competence?

European and international sectoral bodies aim to recognize the diversification and internationalization of qualifications. The emphasis is put on qualifications that are tailored to meet the specific demands of sectors. The European Commission thus addresses the perspective of markets and enterprises in accordance with the employability model. Given this orientation it is no surprise that sectoral frameworks are developed from market and business perspective that leaves out more general objectives and standards of education like those addressed in the principle of vocationalism highlighted in Copenhagen Declaration of 2002 [11]. The two approaches in designing principles and structure of sectoral frameworks can be detected. The first is a competence framework where the relationship between education and work is considered exclusively from the demand side. One such example is the e-Competence Framework (eCF) where competences are described as the demonstrated ability to apply knowledge, skills and attitudes for achieving observed results. This is a holistic concept directly related to workplace activities and incorporating complex human behaviors expressed as embedded attitudes [12]. The basis for the identification of the sector-relevant competences is work process analysis (identification and exact description of the core work process). The crucial point is organization of work. Therefore, for sectoral framework based on competences, it is necessary to establish the link to the context of work and identify/describe core competences that are developed in schools and training enterprises.

The second is a qualification framework where the starting point for the definition of descriptors is not the work-process analysis or company-specific job titles or workplace descriptions, but the academic degree known as qualification. Here, competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the EQF, competence is described in terms of responsibility and autonomy [9].

In Evidence-based training (EBT) concept, the ICAO [13] defines competency as a combination of knowledge, skills and attitudes required to perform a task to the prescribed standard. Core competencies are further defined as a group of related behaviors, based on job requirements, which describe how to efficiently perform a job and what proficient performance looks like. They include the name of the competency, a description, and a list of behavioral indicators (an overt action performed or statement that indicates how the crew handles the event).

In European Plan for Aviation Safety [14], EASA identified having the right competencies and adopting training methods for aviation personnel as a key area. Those competencies are [15]:

- Communication

- Aircraft Flightpath management - Automation

- Aircraft Flightpath management – Manual control

- Leadership and Teamwork

- Problem Solving and Decision Making

- Application of procedures

- Work load Management

- Situational Awareness

- Knowledge.

ICAO concept of EBT therefore may be more suitable to be considered in the perspective of competence framework as it emerged from industry-wide consensus to reduce aircraft fatal accident rates (demand side). Thus, the EBT concept was delivered from international working group facilitated by IATA and other industry representatives which comprised of Civil Aviation Authorities, aircraft equipment manufacturers, airlines, training organizations, but also an academic institution.

To further develop sectoral framework in aviation industry based on qualifications, all possible professional occupations should be considered by conducting occupational and qualification analysis. In general, occupations in aviation industry can be sorted in following categories:

- Air Traffic Control

- Aircraft Maintenance

- Aircraft or Aircraft Systems

- Manufacturing and Design

- Airlines/Pilot (Civil/Military)

- Airports Operations

- Aviation Education

- Aviation Logistics

- Aviation Support Services

- Other Aviation Occupations.

Sectoral qualification framework for higher education (based on EQF) in aviation industry should aim at describing knowledge, skills, and competences to be acquired during study courses, and to be enhanced during the subsequent first years of professional experience [16].

4. CONCLUSION

Aviation industry is a complex system in which experts have a significant role to cope with new procedures and emerging complex technologies. It is soon to be expected that the needs for such experts in the labor market will surpass the offer. Institutions providing training and education for these experts need to have a clear vision of the expectations set by the industry. In this context, consideration should be given to the importance of education and the relationship between certification and experience. Educational frameworks should be designed in such a way that emphasis is placed on each segment to bridge the gap between higher education ("without the knowledge, an individual cannot perform specific job adequately") and the industry ("without the experience, an individual cannot do any responsible job"). Aviation industry is an extremely

challenging and motivating sector, and students enrolling in a particular education program expect to get the level of education (or the right mixture of knowledge, skills and competences) that will adequately prepare them for work in the industry. The outline of Sectoral Qualification Framework in Aviation Industry is proposed, based on two different approaches (competence and qualifications framework). Required knowledge, skills, and competences as categories of qualifications in sector are to be further analyzed based on close collaboration between the industry and higher education institutions.

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