

CompoWIN

More Skilled Hands for Hi-Tech Production



Catalogue of opportunities and barriers for employment

IO1: Competence and Skills Framework



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Introduction

The **Catalogue of opportunities and barriers for employment (COBE)** was created as part of project CompoWin – More Skilled Hands for Hi-tech Production. The project initiative is implemented by a transnational partnership of six organisations of five European countries. Funded by the Erasmus + Programme of the European Commission, the project aims to support the development of the composite manufacturing industry in the European Union (EU). In this aspect, one of the project's main goals is to provide a more comprehensive outlook of the composite industry in the countries that participate in the action. To that purpose, the present Catalogue aims to serve as a roadmap for VET providers, training institutions, **and employers to identify the most common barriers to employment** in the composite industry and modify their training or selection process to minimise/overcome these barriers.

COBE provides an overview of the most common barriers to employment in the composite industry, based on the feedback provided by SMEs of the industry. Furthermore, the Catalogue identifies the potentials to modify training or educational process to minimise and overcome the barriers to employment in the composite industry. As a result of comprehensive research and analysis that led to the development of the Catalogue, project partners identified the **most common barriers for employment in the composite industry, based on SMEs' feedback working in the composite industry. These would help companies, VET providers and other stakeholders in partner countries and Europe to identify the potentials to modify in-house training or educational processes in order to minimise and overcome these barriers.**

The COBE is primarily intended for companies active in the field of composite industry and educational institutions to elaborate suitable educational programs and, consequently, the training and skills developing initiatives that would provide companies with the much-needed workforce. The results and findings of the COBE can support both formal and non-formal education offerings. The COBE is also intended for companies that are (re)focusing on composite production and enterprises with a long tradition of operating in the composite industry.

Methodology

To collect data for the Catalogue, project partners implemented an online survey through an online questionnaire (see [Appendix 1](#)). The questionnaire that was used in the process of developing the Catalogue focused on topics such as **distance to work, adaptation to the workplace, newly emerging trends, specifics of the composite industry** (e.g. physical adaptation to resins and other chemicals), covering all factors affecting the barriers to employment.

The development of the questionnaire was coordinated by the Regional Development Agency – Zasavje (RRA) and AFormX with the active support and input of Kuressaare Ametikool (KAK) and SBG – Dresden. All partners provided feedback to contents, sharing experiences and expertise of their practice. Partners will localise the Catalogue in their language. After the Catalogue is prepared, AformX will digitalise the aggregated results and publish them on the compohub.eu portal in an open forum format. To enable transferability of results, the resource will provide easy modification and/or update.

Through the research and analytical activities project partners **collected** data from companies working in the composite industry with the purpose to serve as a roadmap for VET providers, training institutions and employers to identify the most common barriers to employment in the composite industry and modify their training or selection process to minimise/overcome these barriers.

1. Summary of results

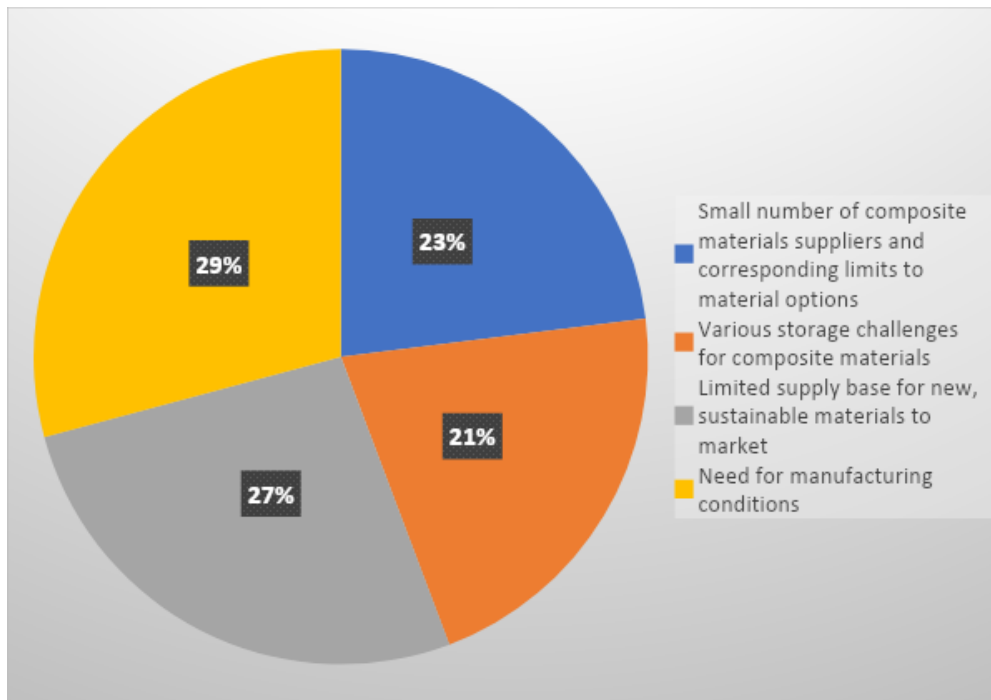
1.1. General information

As part of the research process that led to the development of the present Catalogue, 58 companies of 5 countries participated in the online survey. All companies that responded the online survey were active in the composite industry or had some part of their production processes related and/or using composites. These included enterprises from the following economic fields:

- Trade of materials
- Manufacturing of hot tubs
- Electrical formula construction
- Making models and moulds
- Production and development of carbon composite products
- Manufacture of glass - plastic products
- Repair and maintenance of fibreglass vessels
- Construction and repair of watercraft

- Manufacturing of various composite products
- Production of composites for the construction industry
- Production of furniture
- Production of polymer composites
- Production of electrical industry components
- Production of plastic materials
- Trade and distribution of epoxy resin, hardeners, glass, carbon, etc. composite materials
- Aeronautical technology and precision mechanics
- Manufacture of electrical equipment
- Repair and manufacture of vessels and composite parts
- Manufacturing
- Manufacture of skis, boats and composite products Manufacture of leisure boats and vessels
- Aluminium production
- Manufacture of products from composite materials in aviation, medical equipment and sports
- Development and production of composite elements
- Duroplastic products
- Manufacture of other plastic products
- Production and processing of plastics
- Development and manufacture of lightweight components
- Manufacture of fibre composite components
- Shipbuilding, ship servicing and maintenance
- Distribution of raw materials
- Manufacture of sanitary equipment from acrylic, composite materials and mineral marble
- 3D technologies
- Production of tools and models for foundries

Table 1: Numbers of employees in the companies that fulfilled the online questionnaire



1.2. Exploring the existing employment trends in the composite industry

At the moment of the analysis 72 % of the companies that participated in the research stated that they have a deficit of workers engaged. In comparison only 28 % of them pointed out that they have enough workers in composites. The main reasons for the lack of workers dealing with composites that were identified by participating companies include the following:

- There is a shortage of polisher in the position of the grinder
- There are no people who have the knowledge and desire to work in this field
- There is no quality workforce available
- Plastic specialist would be needed
- Insufficiently skilled workers, it is very difficult to obtain staff for production processes
- It is difficult to cover the growth of programs or the introduction of new products
- Deficit, due to competition and demanding work and especially among young people
- Remoteness from centres
- Inadequately educated and trained workers
- Current scope of work - projects would require more workers

Some of the companies that answered negatively highlighted that they offer very good employment conditions and therefore the shortage of personnel is very low. Others mentioned that the shortage of qualified staff is evident not only in the composite industry but in any other manufacturing activity.

In general the main reasons for the lack of workers in the composite industry or dealing with composites are **the lack of qualified workforce available with suitable knowledge, skills, education and desire to work meaning there is a shortage of people, especially young, that are willing to work in the industry.**

In the field of deficit of workers engaged in composites 63,2 % participants of the research stated that they had in the last three years, on average, a deficit of workers engaged in composites, while 36,8 % participants stated that they did not have in the last three years, on average, a deficit of workers engaged in composites. The reasons for the deficit of composite workers in recent time are the following:

- There is no quality and educated workforce available
- Deficit when correlated with order and production growth
- This shortage was boosted due to the COVID-19 pandemic
- Workers need to be trained to work with composites,
- Lack of production workers to work in three shifts and lack of technical staff
- Inadequately educated and trained workers"

In general, the main reasons for the deficit of workers engaged in composites are **the lack of qualified and educated workers and the lack of suitable training for people that could work in the industry. On the other hand, there COVID 19 pandemic boosted the existing shortage of workers to a higher level.**

When the companies were asked if they would hire experienced, trained and qualified composite workers with a lot of knowledge and experience, the majority 82,5% of participants stated that they would hire such person instantly. In comparison 17,5% stated they would not hire experienced, trained and qualified composite workers with a lot of knowledge and experience. **Conclusion: if the labour market had available experienced, trained and qualified composite workers with a lot of knowledge and experience they would get a job in the composite industry instantly.**

The main findings in the field of hiring experienced, trained and qualified composite workers:

- **There are no experienced workers available on the labour market. Companies have had to train people themselves. It is very good if a person has basic knowledge or previous work / experience / knowledge as they are easier train within the company with its own resources.**
- **A trained and experienced worker is ultimately more beneficial than a low-paid apprentice.**
- **Hiring an employee with training and previous work experience is many times easier for the company in the long run than starting to train the employee yourself.**
- **Worker with expertise is a win-win situation, otherwise on-site training is the only solution, because basic knowledge is often lacking for a product to succeed as materials are changing and also technologies.**
- **People do not want this kind of work, job.**
- **Composite manufacturing requires certain skills and experienced workers are preferred, however due to the relatively low-developed labour market and limited job offerings the workers are hard to find.**
- **They don't need to be introduced to work.**
- **Due to novel technologies in the production process it is difficult to get the know-how.**
- **Problem - losing of a lot of time and productivity through in house learning.**
- **COVID 19 situation reduced the business.**
- **Companies require workers with an understanding of production processes, technology, better productivity and quality of final products.**

- **Working with composites requires certain knowledge and practice of employees, which is currently not available at the employment office.**

From the companies point of view in hiring experienced, trained composite workers with a lot of knowledge and experience 77,2 % of companies that participated in the research stated that they would hire, at this moment, a trained composite worker with no experiences while 22,8 % of companies highlighted that they would not hire, at this moment, a trained composite worker with no experiences. **That results in the lack and demand for suitable education and training programs.**

From the companies point of view in hiring experienced, trained composite workers with a lot of knowledge and experience the **research provided the following key data in the field of employing a composite worker with a lot of knowledge and experience:**

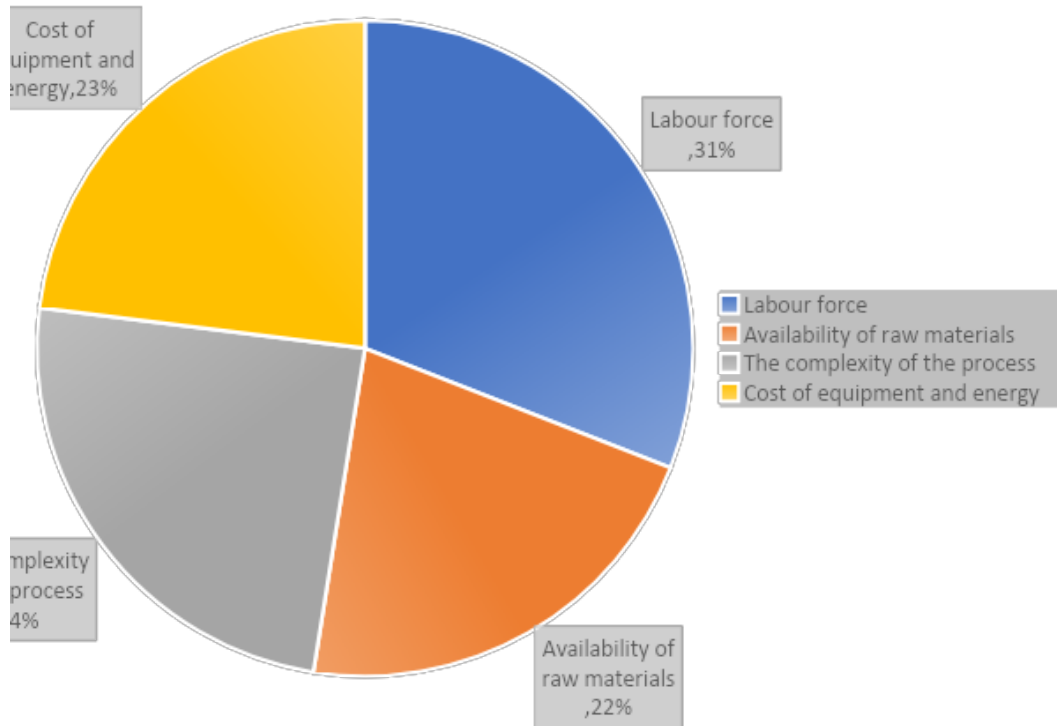
- The distance from the job is not a major factor for employment of a composite worker, while there are still some issues considering the distance to the job, meaning the following:
 - o the location of the company is very important as preferences are given to companies closer to home,
 - o the simpler the logistical location of the company, the easier it is for a person to go to work,
 - o the proximity of the city determines a lot, if we focus on production work, mainly because of a rule that production staff reside within a radius of approx. 30km from the company and above all, you can't ask employees to spend "half" of the day in transit,
 - o the cost of transport to work plays a key role. The further the distance, the greater the financial and time expenditure,
 - o the employees are weighing this up well and want to have compensated for the loss correspondingly more,
 - o workers prefer short distances as people do not like to travel to work for too long and don't like to spend too much time on the road,
 - o in general, employees don't like to travel and prefer the shorter route to work and back
- **Respondents are certain that having access to trained workers would improve their overall competitiveness and company market position** mainly because:
 - o With a more efficient and experienced team, it is possible to develop faster and accept different work types.
 - o The company could increase production capacity and likely to improve quality and also customer service.
 - o There is no need for long training and accommodation period for workers. These employees can start working immediately and there is no need for training.
 - o Higher productivity, mainly because they could then undertake bigger projects as well, easily organise the work to achieve deadlines for suppliers, productivity and business stability would increase, it would enable them to improve GRP moulds/tools and in case they would not need to educate the staff, the time could be used for other purposes.
 - o Would improve the quality of products and shorten the production time. In addition, experienced workers in the organisation would shorten the learning and control time of such employees.

- **Respondents stated that the turnover of employees in the composite industry is very high** due to the following reasons:
 - moving towards better wages and conditions,
 - people with skills and experience are difficult to find,
 - "wage wars" to attract skilled and experienced staff,
 - mainly due to health (eczema due to resins, ...),
 - problems due to manual work, finding a ""cleaner"" work environment
 - transition to other better paid jobs, less demanding production, etc.
 - constant learning of current workers whjile the learning story repeats itself when you get new employees,
 - lack of workers in the labour market,
 - people move from company to company looking for better conditions,
 - find an easier type of job,
 - constant pressure due to the development of new products,

1.3 Composite manufacturing – existing challenges and trends

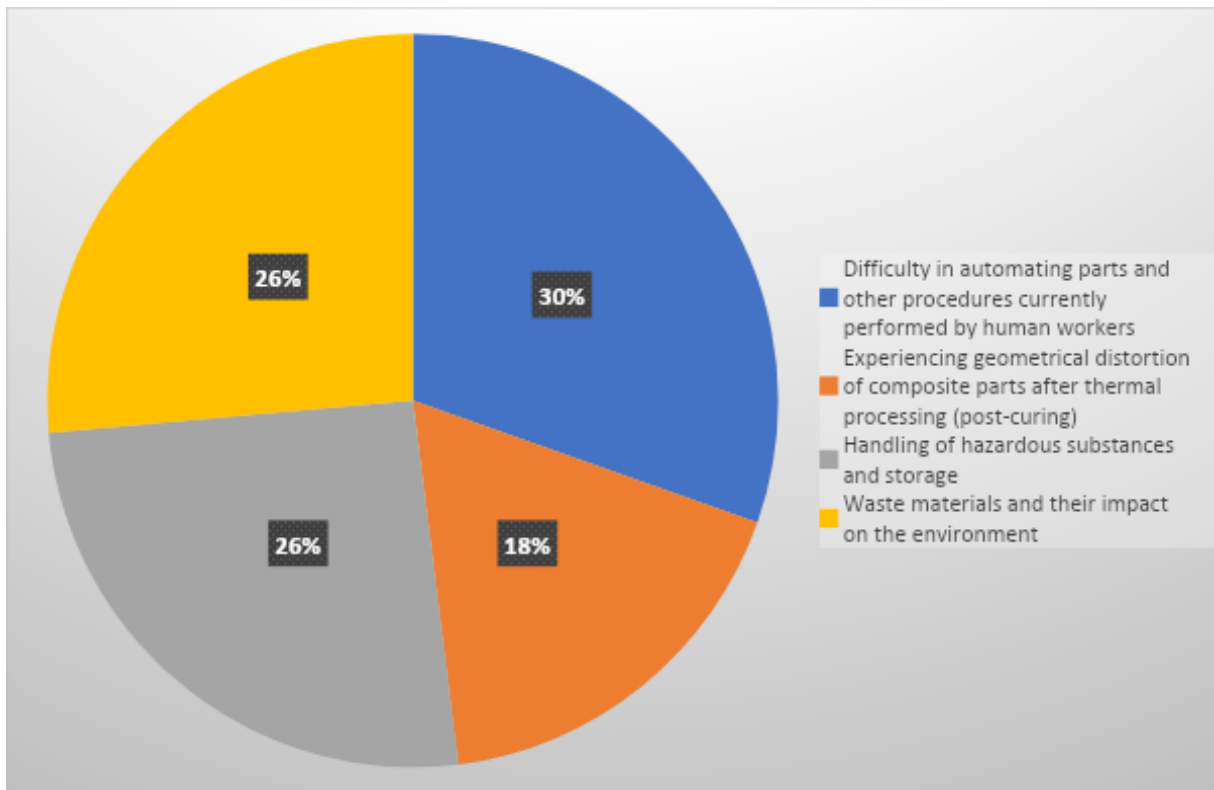
Considering the costs of manufacturing composite materials in the manufacturing process the biggest challenge is **the lack of labour force. Other major concerns result from the cost of equipment and growing expenses of energy (i.e. electricity, natural gas, etc.), the complexity of the procedure and the availability of raw material.**

Table 2: Considering the costs of manufacturing composite materials in the manufacturing process, what is the biggest issue



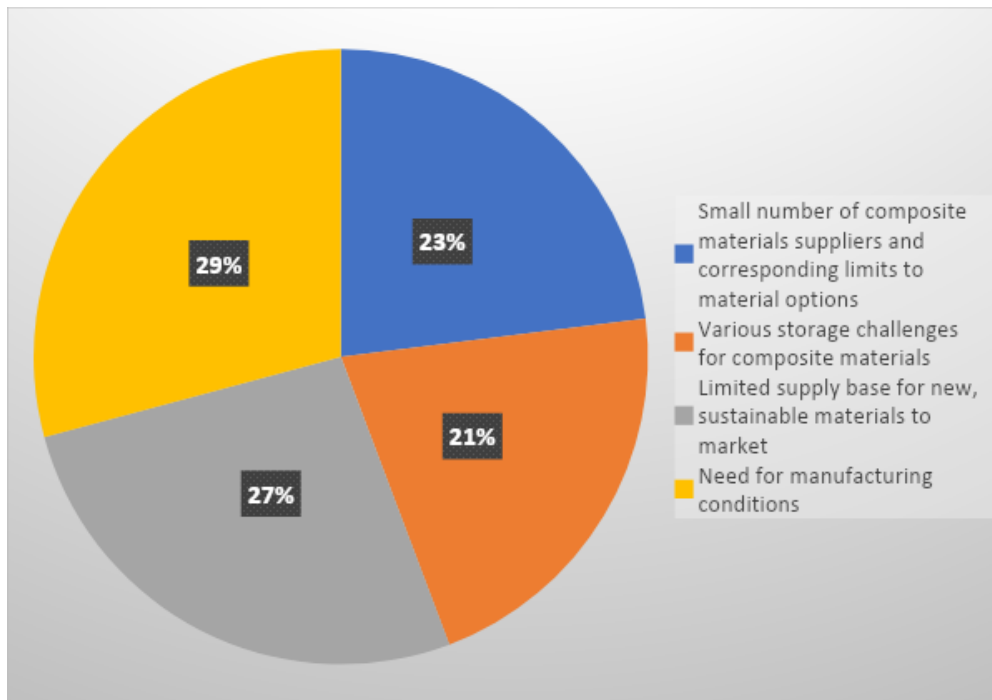
According to the research, considering the process of technology, the biggest issues are related problems with **automation of parts and other procedures and handling as well as storage and waste materials and their impact on the environment.**

Table 3: Considering the process of technology, what is the biggest issue



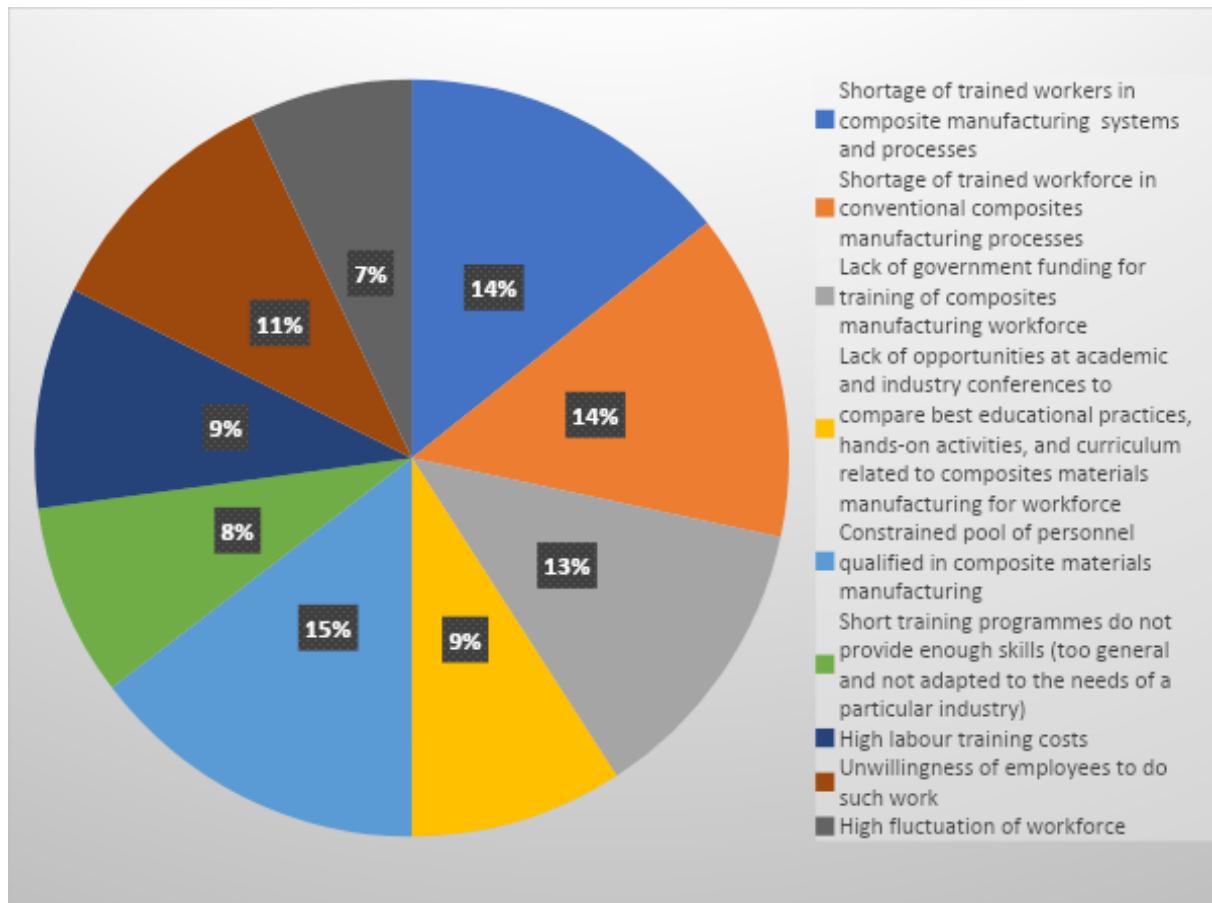
Considering the infrastructure issues, the biggest concerns are the **small number of composite materials suppliers, need for manufacturing, production conditions and limited supply of new sustainable materials on the market.**

Table 4: Infrastructure issues



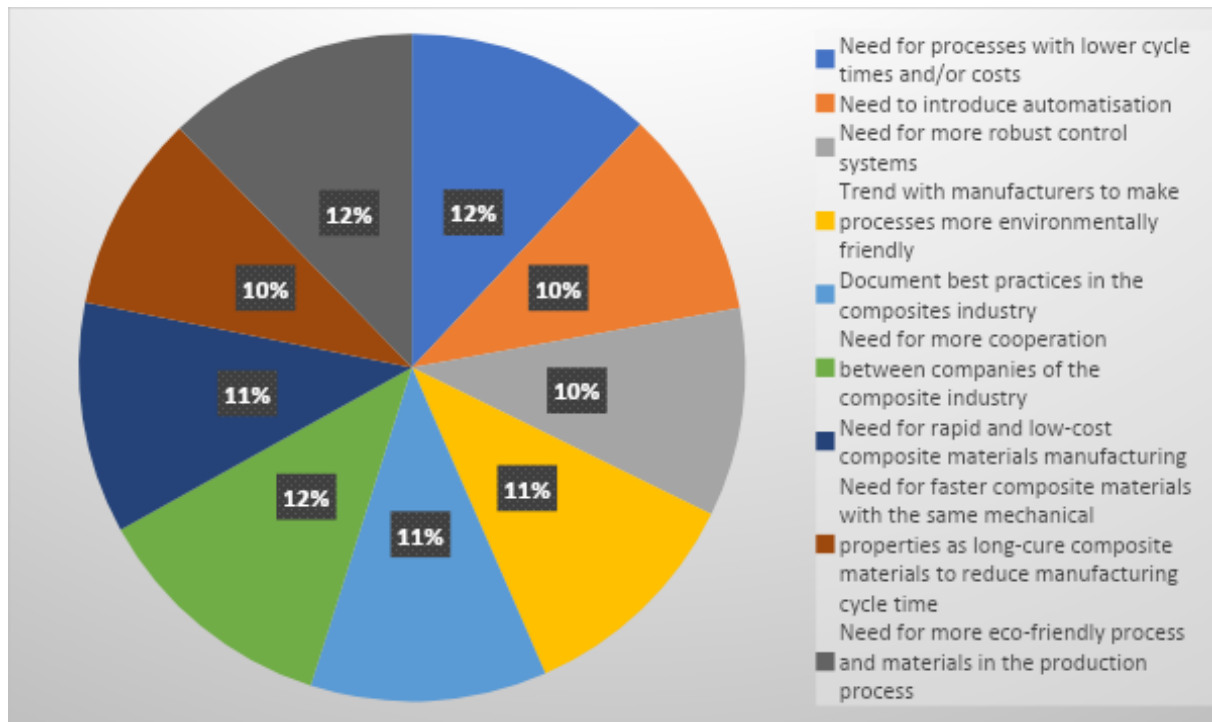
Considering education/training issues, **the biggest concern is a shortage of trained workers in composite manufacturing systems and processes** and in conventional composites manufacturing processes.

Table 5: Education/Training issues



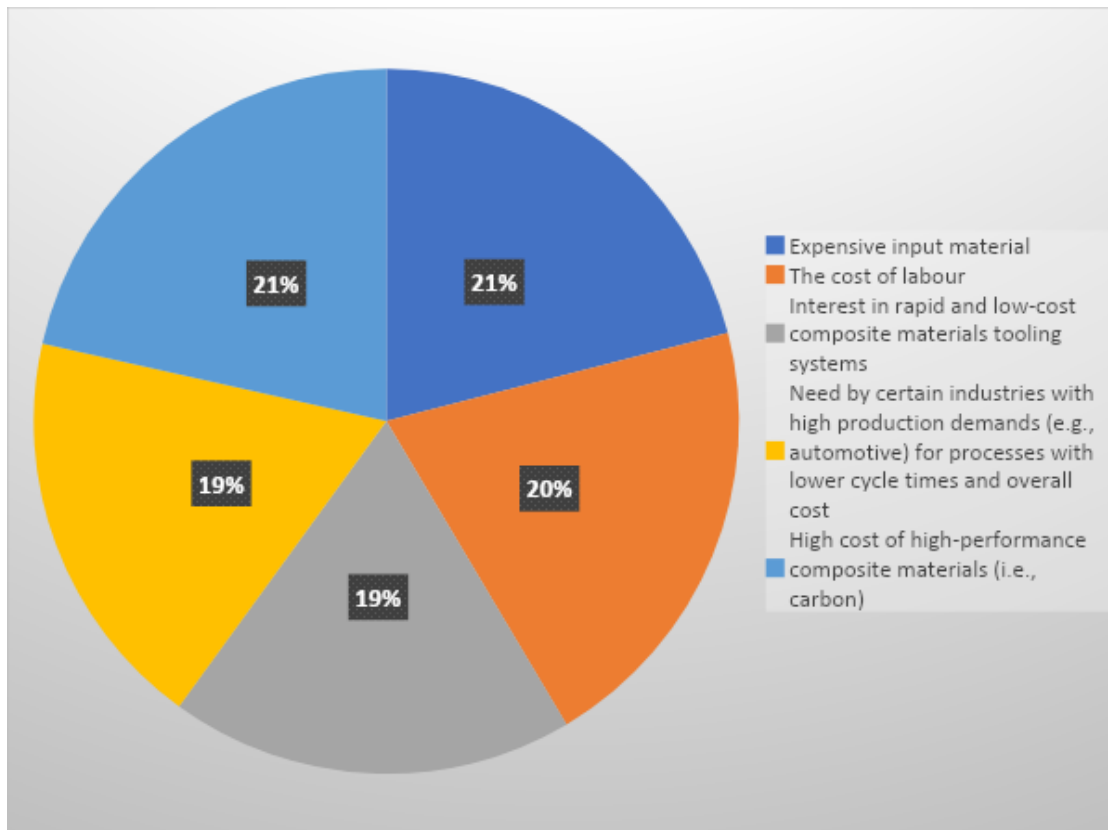
Considering the **composite materials drivers and opportunities**, the companies that participated in the research pointed out that all the stated drivers and opportunities are very important in the development of the composite industry: the need for processes with lower cycle times and/or costs, need to introduce automatisaton, need for more robust control systems, trend with manufacturers to make processes more environmentally friendly, document best practices in the composites industry, need for more cooperation between companies of the composite industry, need for rapid and low-cost composite materials manufacturing, need for faster composite materials with the same mechanical properties as long-cure composite materials to reduce manufacturing cycle time and need for more eco-friendly process and materials in the production process.

Table 6: Composite materials drivers and opportunities



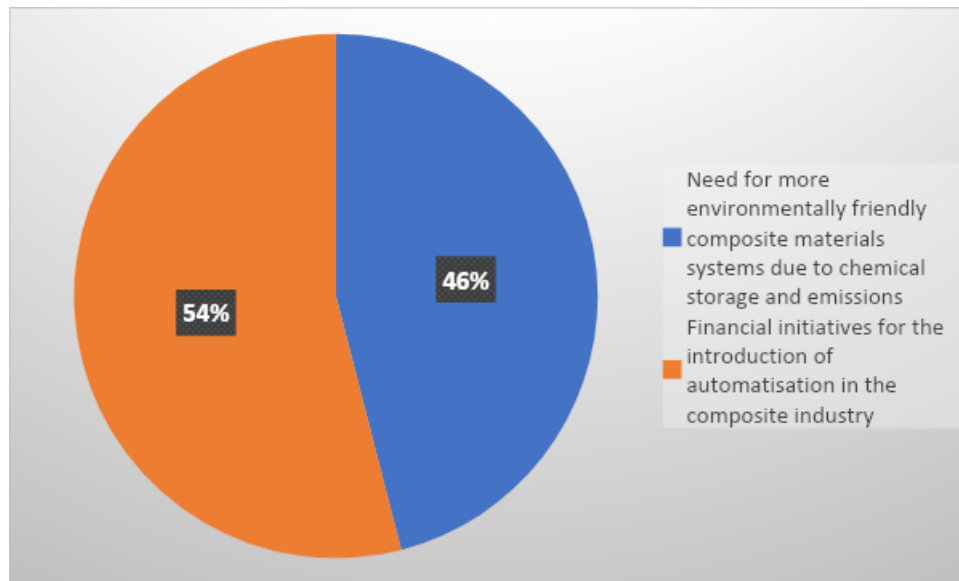
Considering expenses the biggest issues are **the cost of labour, need by certain industries with high production demands (e.g., automotive) for processes with lower cycle times and overall cost, high cost of high-performance composite materials (i.e., carbon)**. In general, all topics were regarded as important issues, with a slight overweight of the cost of labour and the need by certain industries with high production demands (e.g., automotive) for processes with lower cycle times and overall cost and high cost of high-performance composite materials (i.e., carbon).

Table 7: Expenses



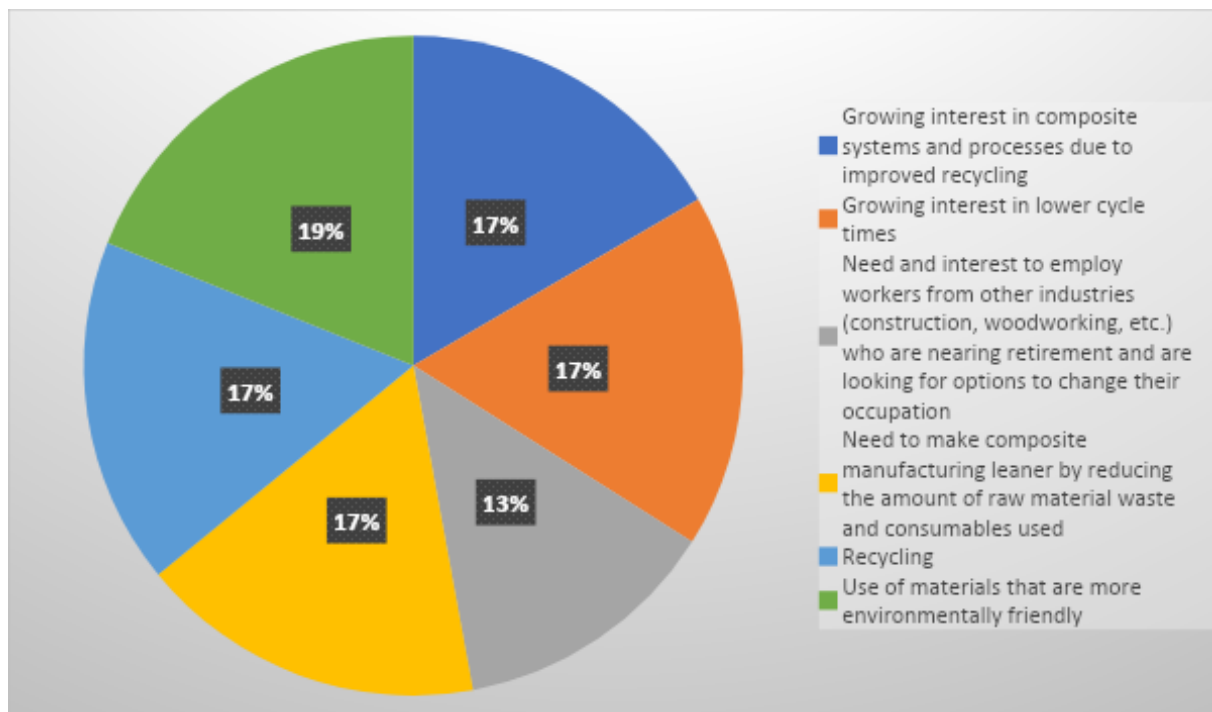
As for government policies the research pointed out that companies in the composite industry would appreciate if government policies would enable **financial initiatives to introduce automatisisation in the composite industry and support the companies in their need for more environmentally friendly composite materials systems due to chemical storage and emissions, menaing to provide companies with financial initiatives that would enqable them to efficiently cope the environmental dangers of the composite industry and production.**

Table 8: Government policies



Considering sustainability in the composite industry, all topics were regarded as important issues, with an overweight on the **growing interest in composite systems and processes due to improved recycling, recycling, use of materials that are more environmentally friendly, and the need to make composite manufacturing leaner by reducing the amount of raw material waste and consumables used.**

Table 9: Sustainability



2. Conclusions and recommendations

2.1 Main conclusions

According to the research, the main reasons for opportunities and barriers for employment in the composite industry:

- Companies have a deficit of workers engaged in composites mainly due to people don't have the knowledge and desire to work in this field, no quality workforce available, shortage of skilled workers, insufficiently skilled workers. It is very difficult to obtain staff for production processes, competition and demanding work. Young people do not desire to work in this field, no educated employees, inadequately educated and trained workers.
- Main reasons for the lack of workers in the composite industry or dealing with composites are the lack of qualified workforce available with suitable knowledge, skills, education and desire to work, meaning there is a shortage of people, especially young, that are willing to work in the industry.
- Companies face a deficit of workers - engaged in composites due to the lack of qualified and educated workers and the lack of suitable training for people that could work in the industry. On the other hand, COVID 19 pandemic boosted the existing shortage of workers to a higher level.
- Lack of suitable education and training programs.

The **main findings in the field of hiring experienced, trained and qualified composite workers:**

- There are no experienced workers available on the labour market, companies have had to train people themselves and it is very good if a person has basic knowledge as they are easier to train within the company with its own resources.
- Working with composites is a very specific profession so it is reasonable to hire a person with previous work / experience / knowledge in this field.
- A trained and experienced worker is ultimately more beneficial than a low-paid apprentice.
- Companies taught a new worker on the spot, in the company with the company's resources and knowledge.
- Hiring an employee with training and previous work experience is many times easier for the company in the long run than starting to train the employee yourself.
- Worker with expertise is a win-win situation, otherwise on-site training is the only solution, because basic knowledge is often lacking for a product to succeed as materials are changing and also technologies.
- People do not want this kind of work, job.
- Experience is beneficial.
- Composite manufacturing requires certain skills and experienced workers are preferred, however due to the relatively low-developed labour market and limited job offerings the workers are hard to find.
- The work is complex and requires a good knowledge of composites.
- They don't need to be introduced to work.

- Due to completely new technology in the production process it is difficult to get the know-how.
- Problem - losing of a lot of time and productivity through in house learning.
- COVID 19 situation reduced the business.
- Companies require workers with an understanding of production processes, technology, better productivity and quality of final products.
- Working with composites requires certain knowledge and practice of employees, which is currently not available at the employment office.

Considering the costs of manufacturing composite materials in the manufacturing process the biggest challenge is **the lack of labour force. Other major concerns results from the cost of equipment and growing expenses of energy (i.e. electricity, natural gas, etc.), the complexity of the procedure and the availability of raw material.**

Considering the process of technology, the biggest issue are according to the research the problems with **automation of parts and other procedures and handling and storage and waste materials and their impact on the environment.**

Considering the infrastructure issues the biggest concerns are **small number of composite materials suppliers, need for manufacturing, production conditions and limited supply of new sustainable materials on the market.**

Considering education/training issues the biggest concern is a **shortage of trained workers in composite manufacturing systems and processes and in conventional composites manufacturing processes.**

Considering the composite materials drivers and opportunities the companies that participated in the research pointed out that all the stated drivers and opportunities are very important in the development of the composite industry: **need for processes with lower cycle times and/or costs, need to introduce automatisisation, need for more robust control systems, trend with manufacturers to make processes more environmentally friendly, document best practices in the composites industry, need for more cooperation between companies of the composite industry, need for rapid and low-cost composite materials manufacturing, need for faster composite materials with the same mechanical properties as long-cure composite materials to reduce manufacturing cycle time and need for more eco-friendly process and materials in the production process.**

Considering expenses the biggest issues are **the cost of labour, need by certain industries with high production demands (e.g., automotive) for processes with lower cycle times and overall cost, high cost of high-performance composite materials (i.e., carbon).** In general all topics were regarded as important issues, with a slight overweight of the cost of labour and the need by certain industries with high production demands (e.g., automotive) for processes with lower cycle times and overall cost and high cost of high-performance composite materials (i.e., carbon).

As for government policies the research pointed out that companies in the composite industry would appreciate if government policies would enable **financial initiatives to introduce automatisisation in the composite industry.**

Considering sustainability in the composite industry all topics were regarded as important issues, with an overweight on the **growing interest in composite systems and processes due to improved recycling, recycling, use of materials that are more environmentally friendly and the need to make composite manufacturing more lean by reducing the amount of raw material waste and consumables used.**

2.2 Recommendations

- **Due to the lack of education and training in the field of composite manufacturing, companies are forced to carry out internal education or look for suitable profiles abroad.**
- **The existence of the provision of such training in the vocational education and training system would relieve companies to some extent, as they will be able to outsource the internal training function.**
- **The existence of a professional standard and a national professional qualification "manufacturer of composite products" on IV. Level accelerates the process of identifying, testing, evaluating and consequently hiring the necessary workers in the field of composite fabrication.**
- **Until the state is aware of the importance of composite materials and this industry there will be no progress in this area and no changes in the school system. Too little effort by the state to attract foreign investors in this area.**
- **The need to address the possibilities of recycling composite materials,**
- **Bosting the development of the industry with governmental initiatives and financing and implementing new educational/training programs in order to reduce the deficite of the work force.**
- **Transfer of knowledge about composites inside companies as well as outside companies could significantly bust the development of the composite industry as well as the Cost-effective recycling of GRP waste.**

Appendix 1

ONLINE SURVEY STRUCTURE AND QUESTIONS

Part 1: General information

Company name:

Abbreviated company name (if applicable):

City / town:

Email:

Web page (if applicable):

Contact person:

Main activity:

Number of employees:

Year of establishment:

Company size:

- Micro (1-9 employees)
- Small (10 – 49)
- Medium (50 -250)
- Large (250>)

Part 2: Exploring the existing employment trends in the composite industry

1. Do you have, at this moment, a deficit or surplus of workers engaged in composites?

- Yes
- No

If Yes, please specify:

2. Have you had, in the last three years, on average, a deficit or surplus of workers engaged in composites?

- Yes
- No

If Yes, please specify:

3. From your current experience and attitude, would you hire, at this point, experienced, trained composite workers with a lot of knowledge and experience?

- Yes
- No

Please provide more information:

4. Would you hire, at this point, trained composite workers with no experience?

- Yes
- No

Please provide more information:

5. Is the distance from the job also a factor in employment?

- Yes
- No

If the answer is YES, please provide a detailed explanation.

6. If there is an option to get company workers who are trained with composite skills, would that change your business?

- Yes
- No

If Yes, please specify:

7. Do you feel the "turnover" of workers in composite production?

- Yes
- No

If Yes, could you please elaborate on the reasons for that:

Part 2: Composite manufacturing – existing challenges and trends

Please rate the following statements (Strongly disagree / Disagree / Neutral / Agree / Strongly agree):

8. Considering the costs of manufacturing composite materials in the manufacturing process, what is the biggest issue?

- A) Labour force
- B) Availability of raw materials
- C) The complexity of the process
- D) Cost of equipment and energy

9. Considering the process of technology, what is the biggest issue?

- A) Difficulty in automating parts and other procedures currently performed by human workers
- B) Inherent distortion of composite parts after any thermal processing
- C) Handling of hazardous substances and storage

D) Waste materials and their impact on the environment

10. Infrastructure issues

- A) Small number of composite materials suppliers and corresponding limits to material options
- B) Chemical storage and VOCs for new thermoset composites systems
- C) Limited supply base for new, sustainable materials to market
- D) Need for manufacturing conditions

11. Education/Training issues

- A) Shortage of trained workers in composite manufacturing systems and processes
- B) Shortage of trained workforce in conventional composites manufacturing processes
- C) Lack of government funding for training of composites manufacturing workforce
- D) Lack of opportunities at academic and industry conferences to compare best educational practices, hands-on activities, and curriculum related to composites materials manufacturing for workforce
- E) Constrained pool of personnel qualified in composite materials manufacturing
- F) Short training programmes do not provide enough skills (too general and not adapted to the needs of a particular industry)
- G) High labour training costs
- H) Unwillingness of employees to do such work
- I) High fluctuation

12. Composite materials drivers and opportunities

- A) Need for processes with lower cycle times and overall cost due to high production demands by certain industries
- B) Need to introduce automatisation
- C) Need for more robust control systems
- D) Trend with manufacturers to make processes more environmentally friendly
- E) Document best practices in the composites industry
- F) Establish a more composite industry
- G) Need for rapid and low-cost composite materials manufacturing
- H) Need for faster composite materials with the same mechanical properties as long-cure composite materials to reduce manufacturing cycle time
- I) Need for more effective and production-friendly adhesives and processes

13. Expenses

- A) Expensive input material
- B) The cost of labour
- C) Interest in rapid and low-cost composite materials tooling systems
- D) Need by certain industries with high production demands (e.g., automotive) for processes with lower cycle times and overall cost
- E) High cost of high-performance composite materials (i.e., carbon)

14. Government policies

- A) Need for more environmentally friendly composite materials systems due to chemical storage and emissions

B) Financial initiatives for the introduction of automatisisation in the composite industry

15. Sustainability

- A) Growing interest in composite systems and processes due to improved recycling
- B) Growing interest in lower cycle times
- C) Growing interest in better end-of-life options
- D) Need to make composite manufacturing leaner by reducing the amount of raw material waste and consumables used
- E) Recycling
- F) Use of materials that are more environmentally friendly

Part 3. Further contact

16. Are there any other details for the development of the composite industry that you would like to share?

- Yes
- No
- If yes, please share:

17. Would you be interested in receiving the results of the research and participate in the subsequent activities of the project?

- Yes
- No
- If yes, please provide a valid email where we can reach you. We will also send you the results of the survey. Email:

Thank you for your time for completing the survey 😊