
Sustainable Development of Professional Competences – Insights from an International Project within Interreg Brandenburg-Poland 2021-2027

Submitted 08/10/24, 1st revision 20/11/24, 2nd revision 06/12/24, accepted 10/12/24

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Abstract:

Purpose: The main objective of the study is to present the assumptions and goals for the sustainable development of professional competences of the international Project: „Education Connects – Development of digitally networked competence centres for vocational training in the context of Industry 4.0” within the Interreg VI A Brandenburg-Poland 2021-2027 programme. Moreover, it aims at providing examples of good practice for cooperation between education institutions, business and regional authorities to ensure measurable outcomes of vocational education in a cross-border environment.

Design/Methodology/Approach: In order to achieve the research objective an explorative qualitative study was conducted. The nature of the case study is descriptive and practical orientated and the research subject was selected with a purposeful sampling technique. Primary data was obtained in 2024 using the method of direct interviews (10 informants related to the Project), participatory observation, and inference in the form of recommendations. To confront a variety of data sources the principle of triangulation was applied.

Findings: The study illustrates real practice-oriented activities focused on digitalization of the vocational education process and training of professional competences. Two Competence Centres (KomZen 4.0) and digital „Learning Factories 4.0” are intended to be a response to the challenges related to the rapid adaptation of teaching programs to the needs of the market and Industry 4.0, as well as an innovative channel for the diffusion of expert knowledge and experience.

Practical Implications: The designed activities and objectives of the cross-border project provide examples of good practice in the development of professional competences in the digital era, and thus can inspire other vocational education institutions, companies and local authorities to use these practices and apply them for their own cross-border projects. The expected project outcomes may support decision-makers involved with vocational education, internationalization and business collaboration more broadly.

Originality/Value: The originality lies in presenting the real vocational education context in the cross-border perspective. The study reflects on challenges and new solutions supporting the digitalization of the professional development. The value of the research is of an application nature for vocational education institutions and contributes to the dissemination of good practices.

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Keywords: Case study, cross-border collaboration, professional competences, sustainable development, vocational education.

JEL Codes: I20, J24.

Paper Type: Research article.

Acknowledgement: We would like to express our gratitude to the Partners of the international Project: „Education Connects – Development of digitally networked competence centres for vocational training in the context of Industry 4.0” (Interreg VI - BBPL0100042), Stakeholders and Participants of the „Start Time 2024” for supporting the development of professional competences in the Brandenburg-Poland cross-border area, for participating in the interviews and providing valuable feedback.

1. Introduction

Economic changes, the development of new information and communication technologies, the digitalization of industry, as well as the increasingly noticeable effects of climate change are crucial challenges for all of us. Dealing with them is crucial for sustainable development and attractive living conditions. Hence, in all areas of the economy there is a great demand for educating specialists and experts who will be able to find innovative solutions to the accumulating problems.

The search for effective and sustainable development of professional competences and transformative changes in curricula and in the technical infrastructure constitute significant challenges both for vocational education at the secondary school level, the administration supporting education in the region, for enterprises as well as for higher education institutions (HEIs) (Audretsch and Belitski, 2021; Badzińska and Mrugalska, 2022; EUNICE, 2024; European Commission, 2022; Garcez *et al.*, 2022; HEInnovate, 2024; Johnston and Johnston, 2024; Mikeladze and Gogmachadze, 2024; Szafranski *et al.*, 2017).

Although a wide range of methods, tools and interactive channels is available, in order to develop professional competences „students need clear objectives and understanding embedded in multidisciplinary knowledge and transferable competences” (Badzińska, 2021, p. 77) to implement useful solutions in business practice.

For the above reasons, education institutions must become more open to practitioners and experts in order to provide learners with the most up-to-date professional knowledge and competences adapted to the needs of the labour market.

Thus, they have to be more active actors linked to their external environment and take action to stimulate learning opportunities against the background of the wider socio-economic and cultural context promoting cross-border projects.

It is therefore necessary to support interdisciplinary projects that contribute to strengthening professional, scientific and research cooperation as well as the diffusion of knowledge and technology transfer through networking, expanding existing and creating new cross-border cooperation between public administration, vocational education institutions, universities and enterprises. All actions taken should be future-oriented and provide sustainable solutions.

The subject of such cooperation should be the creation, sharing and promotion of joint educational offers and components for all age groups and fields of education, both in analogue and digital form. Appropriately adapted solutions are needed to exchange knowledge and professional competences, also across borders, and to network regional labour and education markets.

An example of good practice in the area of cross-border exchange of knowledge, intercultural and interdisciplinary competences as well as digital transformation is the „*Interreg 2021-2027:Fostering Cooperation for a Stronger Europe*“ programme. Interreg is one of the key instruments of the European Union (EU) supporting cooperation across borders through project funding. It aims to jointly tackle common challenges, support a wide range of activities and find shared solutions within such priorities as: transfer of knowledge and technology, climate change and biodiversity, education, culture and tourism, cooperation of residents and institutions (<https://interreg.eu/>).

In order to contribute to the dissemination of practice in the field of the development of professional competences, this study, inspired by the prior work of the author on experiential learning and teaching in multicultural teams (Badzińska, 2019; 2021; Badzińska and Timonen, 2020) and by many years of experience of the co-author as a Head of Vocational Education School administration, attempts to present insights from a cross-border project within the Interreg VI A Brandenburg-Poland 2021-2027 programme.

The main objective of the study is to present the assumptions and goals as well as the first practice-oriented activities undertaken for the sustainable development of professional competences within the framework of international cooperation between education institutions, businesses and regional authorities on the example of the Project: „*Education Connects – Development of digitally networked competence centres for vocational training in the context of Industry 4.0*” (In this article, the short name of the project will be used, namely „*Education Connects*”).

The insights from the project are presented here using the case study method. It is based on the authors’ experience, participatory observation, and collaboration within

the project. Additionally, the co-author represents the lead partner of the case studied here. The originality of the applied case study lies in presenting the challenges associated with achieving the intended project goals, which are to contribute to the sustainable development of professional competences of all parties involved. Due to the qualitative, descriptive, and largely subjective nature of the research the expected outcomes cannot be generalized. Nevertheless, the presented study can serve as an example of good practice in the field of vocational education and building relationships with business.

2. Literature Review

The review of literature on the topic, aimed at demonstrating the research gap that the study intends to address. The importance the European Community attaches to development of competences was already underlined in the European Charter for Small Enterprises in 2000 which stated: *„Europe will nurture entrepreneurial spirit and new skills from an earlier age. (...) Specific business-related modules should be made an essential ingredient of education schemes at secondary level and at colleges and universities”* (Salzano, 2006, p. 21).

The current changes in the surrounding environment require new competences and new ways of teaching and learning (European Commission, 2022; Guerrero *et al.*, 2021; Sidrat *et al.*, 2023), smart specialisation strategy to sustainable development co-creation (Rinaldi *et al.*, 2018) as well as mission-reorientation towards social innovation (Menter, 2024).

Nowadays, due to the high dynamics of technology and economic development related to Industry 4.0, the need to create unique and challenging curricula for developing the necessary professional competences is still valid. Moreover, the role of contemporary education is to provide learners with cognitive strategies that will enable them to see their way to self-development, to define goals, and achieve business success (Sánchez *et al.*, 2016). All the more, practice-oriented vocational education is today crucial for developing professional competences, attitudes, and behaviours that are a necessary condition for an innovative and competitive economy of the country and beyond.

The major challenge for researchers and educators in relation to vocational education and transversal competences is still the appropriateness of curricula and training programmes. New teaching models, approaches, technical capabilities and IT infrastructure (e.g., e-learning platforms, mobile devices, distance learning networks, interactive communication forums) offer a wide range of methods, tools, and communication channels.

Unfortunately, the multitude of the offer does not always mean its quality. Moreover, many vocational courses do not prepare participants for real business life and the acquired knowledge and skills do not meet the market needs or are

insufficient. Vocational education institutions, both at secondary and higher levels, are facing this problem and still looking for more effective teaching approaches and facilities.

Creativity and innovation potential do not grow without challenges and real life engagement. However, proper practice and the right training can provide skills and knowledge and create opportunities for compelling solutions. In the development of competences it is necessary that learners themselves do take responsibility for the learning process. *„This process should be participatory, involving, and challenging in a way that requires critical thinking and problem-solving skills”* (Badzińska and Timonen, 2020, p. 7).

Creating widespread awareness among staff, learners, and administrative decision-makers of the importance of developing appropriate competences necessary in the digital economy is therefore a crucial task of education institutions. Furthermore, as internationalization is increasingly integrated into the strategic processes of education, it has become essential to enhance performance in cross-border environments.

Vocational education institutions try to integrate practice-oriented education into the curricula using different methods, tools, and learning pace depending on the availability of expertise and resources. Unfortunately, there is no single best way, so we need to look for good practice. In this context, the goals of the *„Education Connects”* project can be a useful path in shaping the desired competences and skills.

Universities are also expected to take appropriate actions and have a greater impact on their environment. This area is particularly important in the context of the university's contribution to socially responsible and sustainable activities and the change *„from third mission to sustainable development co-creation”* (Rinaldi et al., 2018, p. 67). There is a need to *“empower universities as actors of change in the twin green and digital transitions”* (European Commission, 2022, p. 8).

Furthermore, as outlined by the European Commission on a European Strategy for Universities (2022, p. 9), the new framework needs to *„facilitate and reinforce transnational cooperation between universities to strengthen their capacities to equip young people, lifelong learners and researchers with the right competences and skills.”*

For this reason, great emphasis is currently placed on the need for high flexibility of higher education institutions in its response to the environmental requirements (Klofsten et al., 2019; Audretsch and Belitski, 2021; HEInnovate, 2024), especially to digital transformation (Guerrero et al., 2021; Garcez et al., 2022; HEInnovate, 2024). It is undoubtedly necessary to conduct regular research on the practical implementation of new concepts and formats to create favourable conditions for

sustainable development of competences.

Another important aspect is access to educational services that provide examples of good practice in teaching and learning and showcase different institutional approaches on an ongoing basis. In response to this expectation, the European Commission and the OECD jointly support the development of the HEInnovate online platform (<https://heinnovate.eu/en>).

It is a self-assessment tool for HEIs who wish to explore their innovative potential and improve their educational programmes. HEInnovate provides learning materials, case studies, and a pool of experts. It aims to increase teachers' competences and skills and upgrade their pedagogical tools in a given field by providing them with a comprehensive training package.

Numerous education institutions, especially vocational, technical, and business ones, are looking to play an influential role in educating future generations and equipping them with the necessary competences required in the labour market and economic environment.

3. Research Methodology

The main objective of the study is to present the assumptions and goals for the sustainable development of professional competences within the framework of the international Project: „*Education Connects*” in the Interreg VI A Brandenburg-Poland 2021-2027 programme. Moreover, it aims at providing examples of good practice for cooperation between education institutions, businesses, and regional authorities to ensure measurable outcomes of vocational education in a cross-border environment.

In order to achieve the research objective and exemplify the good practices an explorative qualitative study was conducted. The necessity to confront a variety of data sources forced the application of the principle of triangulation (a multi-method research approach) (Glinka and Czakon, 2021). An in-depth analysis of project documentation was conducted through the prism of „the leader-driver” of the project, which is the Oder-Spree District in Germany.

Furthermore, data from secondary sources (Interreg programme websites, partner websites, local media materials, press releases) was expanded with own qualitative research. Primary data was obtained from direct interviews with project partners (4 people) and stakeholders (6 people) who participated in the „*Start Time 2024*” training and career fair that launched the project.

The interviews covered the following areas: (i) general questions about the project leaders, partners, and stakeholders; (ii) scope of services and facilities they provide to create a conducive environment for development of professional competences in the region; (iii) expected results of the cross-border cooperation in the area of

digitalization of vocational education process.

Practical knowledge in vocational education and experience of the informants in the cross-border region led to the conclusion that data obtained from direct interviews will help enrich the study findings. Furthermore, the source of primary data was also the authors' participatory observation in the „Start Time 2024” event, reflection, and experience gained in the development of professional competences.

Moreover, the co-author represents the project leader, which made it possible to obtain the project documentation and decide on the purposeful selection (Patton, 2002) of the case studied here. The nature of the presented case study is descriptive and practical orientated.

The rationale for the use of the case study is its usefulness for the practice-oriented approach (Yin, 2014) and the fact that it helps share insights on the actual activities planned in the project for sustainable development of professional competences and diagnose potential challenges.

Even as a subjective and descriptive case study, it illustrates the real challenges and actions for the sustainable development of professional competences and preparing learners for the requirements of the labour market and Industry 4.0 in a cross-border context.

4. Research Results

Interreg is a key European Union (EU) instrument that strengthens cooperation between regions and countries within the EU. As part of the EU's Cohesion Policy, Interreg plays a vital role in promoting regional development, cohesion, and reducing economic disparities. For the 2021-2027 period, Interreg is focused on addressing current challenges like climate change, digital transformation, and social inclusion (<https://interreg.eu/about-interreg/>).

In turn, within the Interreg, Interreg VI A Brandenburg-Poland 2021-2027 is a cooperation programme to promote projects in the Brandenburg-Polish border region (<https://interreg-brandenburg-polska.eu/>). It is co-financed by the European Regional Development Fund. Under *Priority 3: Attractive Borderland – Education, Culture and Tourism*, the administration of the European School Upper School Center (OSZ) in Eisenhüttenstadt of the Oder-Spree District (Eastern Brandenburg, Germany) and the Centre for Vocational and Continuing Education in Sulechów (CKZiU) of the Zielona Góra District (Poland) acquired a project aimed at supporting the digitalization of vocational education and training and the sustainable development of professional competences in the Euroregion. The acquired project is called: „*Education Connects – Development of digitally networked competence centres for vocational training in the context of Industry 4.0*” and it will be implemented in the period November 1, 2024 - October 31, 2027.

In order to meet the current challenges of vocational education and adapt competences to the needs of the labour market and the digitalization of the economy, the „*Education Connects*“ project aims to achieve the following goals:

- Establishment of two Competence Centres (KomZen 4.0) of vocational education of Industry 4.0, one in each partner country.
- Development of joint educational modules and their integration into regular teaching in the field of training of electronics technician and industrial mechanics.
- Development of activities for improving intercultural skills in vocational education and training for teachers.
- Implementation of the pilot project – development and use of virtual classrooms in combination with „*Learning Factory*“ systems in the field of Industry 4.0 didactics.
- Creation of technical and didactic foundations through joint investments in equipment and educational resources.

According to the informants, supporting cross-border cooperation within this project should enable the intensification of peer learning, hands-on experience and the acquisition of intercultural and interdisciplinary competences necessary in the digital economy.

5. Discussion

5.1 The Case of the „*Education Connects*“ Project within the Interreg Brandenburg-Poland Programme

The authors of this study have been cooperating since 2021 in the field of supporting academic entrepreneurship and vocational education. In December 2023, a Letter of Intent for academic cooperation in developing professional competences was signed between the Oder-Spree District (Germany) and the Faculty of Engineering Management of the Poznan University of Technology (Poland). The Project: „*Education Connects*“ is a new platform for cross-border cooperation between both institutions, which prompted the authors to analyze this particular project.

Streamlining the process of sustainable development of professional competences necessary for working in enterprises with a high level of digitalization and automation is one of the significant challenges of the „*Education Connects*“ project. In this study, the focus is on cross-border challenges, actions and initiatives aimed at working out practical methods and tools for practice-oriented and result-driven vocational education to support learning and teaching process in the digital age.

The aim of the activities planned in this project is to best adapt to the needs of the economy, students and teachers in the Euroregion and to intensify cooperation

between vocational education institutions, regional authorities, and enterprises. Based on the existing cooperation between the authorities and teachers of both vocational education institutions (OSZ Eisenhüttenstadt and CKZiU Sulechów) and the school administration, the project partners indicated significant challenges currently facing vocational education institutions in the Euroregion. These include:

- Adapting teaching to current trends in the field of Industry 4.0;
- Increasing the attractiveness of vocational education and training;
- Making vocational education visible as a career opportunity;
- Activating participation in the digitalization of vocational education and training;
- Incorporating the improvement of intercultural competences into the profile of vocational education;
- Developing language competences of teachers and students in the language of the neighbour.

According to Establishment of two Competence Centres (KomZen 4.0) of vocational education of Industry 4.0, it was assumed that project partners (OSZ Eisenhüttenstadt and CKZiU Sulechów) will provide, taking into account the needs of the labour and education market, attractive offers of education and professional development to all interested parties. This will be possible based on complementary technical equipment in the formula of digital „*Learning Factories 4.0*“ (eLearning).

It should be emphasized that the Competence Centres (KomZen 4.0) aim to integrate the digital standards of Industry 4.0 into everyday school life, taking into account existing structures and processes. Implementation of the pilot project in the field of Industry 4.0 didactics will play an important role here and indicate areas requiring improvement. Moreover, the development of joint educational modules should contribute to increasing the attractiveness of vocational education defined by regional needs.

Additionally, the „*Learning Factories*“ will constitute a so-called „digital bridge“ for sustainable cooperation between both institutions. The project participants will be able to offer and successfully implement educational offers in the cross-border area location-independent. The examples and processes developed in „KomZen 4.0“ can then be transferred to other education institutions. To ensure this, a continuous improvement process will be introduced to balance and optimize the use of resources. Such planned activities should create added value for all entities involved in vocational education and development in the cross-border area.

Furthermore, the pilot program aims to create a foundation enabling teachers and trainees to have a positive impact on the area of mutual connections. A prerequisite for developing appropriate solutions is their applicability throughout the entire professional life cycle, from career counseling through vocational training to professional development, in order to provide a common „learning space“ for the

broad social and intergenerational acceptance of lifelong learning. This will enable the Competence Centres to create attractive, networked educational offers that will find cross-border applications in the digital age.

5.2 The Start Time 2024 – Example of Good Practice

The discussion reflects the main findings gathered during the „*Start Time 2024*” training and career fair in the Oder-Spree District, which was also an opportunity to officially inaugurate the „*Education Connects*” project. The considerations are based on the authors’ experience as co-organizer, interviews with several exhibitors (Polish and German companies) and project partners as well as on participant observation and reflection.

„*Start Time*” (original name „*Startzeit*”) is a regionally anchored platform for a variety of activities related to vocational training and professional development. It is primarily intended for young people from the state Brandenburg (Germany) who are looking for a training company, employer, university place, dual study offers or appropriate career counseling. There are various formats for support, namely: newsletter (in digital and print form), *Start Time Digital* platform as well as analog events (<https://www.start-zeit.de/>).

Start Time Digital is intended to support young people in choosing a career providing insights into all companies in Brandenburg to help learners get off to a successful start. Students can find verified companies, institutions, and schools for their education and competence development (<https://startzeit-digital.de/>).

Moreover, an additional goal is to create networks between learners, training companies, and schools throughout the region Brandenburg and in the cross-border area with Poland. Companies and exhibitors participating in the training and career fair are offered the best possible framework to present themselves and to enable further contact opportunities with potential trainees.

On October 12, 2024, the largest training and career fair in the state of Brandenburg started in the ArcelorMittal training hall in Eisenhüttenstadt to show young people and students what future opportunities the region has to offer. It is worth noting that about 75 companies participated and presented their training and career opportunities and more than 4,000 visitors learned about various offers of training and vocational education (Neiser, 2024).

It should be emphasized that ArcelorMittal Ltd is one of the largest employers in the Brandenburg region and also the co-organizer of the training and career fair. The exhibitors included well-known companies and institutions in Brandenburg such as Heckmann Stahl- und Metallbau Ost Ltd, Klinikum Frankfurt (Oder) Ltd, Deichmann Ltd, IHK Ostbrandenburg, Chamber of Crafts Frankfurt (Oder), Competence Network for Securing a Skilled Workforce in East Brandenburg e. V.,

E.DIS Netz Ltd, Vökl Eisenhüttenstadt Ltd and Polish companies such as Stal Gorzów and VINSTA Civil Company as well as state authorities and medium-sized companies.

Referring to one of the co-organizers, *„ensuring the availability of specialists and skilled workers is one of the key challenges for the successful development of East Brandenburg as a business and educational location.”* Moreover, an important contribution is the expansion of cooperation with the nearest neighbour country, Poland. According to the project leader, *„the OSZ Oder-Spree has maintained close ties with partner organizations and schools from Poznań, Sulechów, Sulęcín and Choszczno for years.”*

The event organizers strongly emphasized the importance of vocational education and regional development encouraging young people to actively participate in the *„Start Time 2024”*: *„Vocational training creates skilled workers and opens up future prospects, because good training is the foundation for success. We will show you the diversity of the region – come by and see what suits you”* (<https://www.start-zeit.de/>).

The above example of good practice in the form of a training and career fair allows participants to gain hands-on experience and compare the best offers. To encourage the development of professional competences, students are given a balance of practical input and prerequisites so that they can apply for training or vocational education in the company of their choice.

Additionally, companies participating in the fair offer activities involving the direct engagement of visitors, interactive communication, and the opportunity to test selected products. The above practices certainly help identify, prioritize, and follow key paths of professional education. However, they require continuous improvement and flexible adaptation to market expectations.

6. Limitation of the Study

The results reflected in this paper are limited to the explorations by the authors who are themselves involved in the competence development process within the project presented here. Due to the purposeful selected informants within the case and its qualitative nature, no generable conclusions can be drawn.

Despite these limitations, this study illustrates real practice-oriented activities focused on digitalization of the vocational education process and training of professional competences, and thus can inspire others education institutions, companies and local authorities to implement cross-border projects and provide examples of good practice.

7. Conclusions

The transformative changes in the vocational education paradigm require a better understanding of past trends and future directions. From this point of view, it is necessary to create networks, strategic alliances, and joint projects with industry, government, and diverse education institutions.

The more demanding operational environment is making vocational education institutions really rethink how they can educate effectively and meet with the future working life and the rapidly changing needs of society and industry. Nowadays, the economic and social changes in the world also show the importance of developing an entrepreneurial mindset and creativity skills suitable for operation in an increasingly turbulent environment.

However, educational practice confirms that there is no one right teaching model or attitude but alternative strategies to identify the best match between curricula, teaching techniques, and market demands. This implies that learners must acquire the latest professional knowledge and competences to successfully compete on the market both as self-employed or as employees of other companies.

Moreover, it should be noted that the quality of the learning process depends not only on the pedagogical approach and the expert knowledge of vocational teachers but, above all, on the involvement and internal motivation of the course participants themselves.

One of the key effects of the project studied here will be the use of jointly developed training modules that can be applied in everyday school life as well in vocational education and training institutions regardless of location via digitally connected „*Learning Factories*”. Thus, the results of the project can offer a good practice guide and inspire both teachers and learners to share their experiences in digital vocational education.

For example, an open access public platform in the field of vocational education can help test new curricula, teaching methods and learning outcomes, and thus contribute to developing and spreading innovative pedagogies and provide feedback for active educators. Moreover, such an access to practical knowledge can encourage teachers to follow up and reflect on their own teaching methods, tools, and experimentation increasing the effectiveness of developing appropriate competences for the future.

Summarizing, an important advantage of reciprocal learning, which is the essence of the „*Education Connects*” project, is an opportunity to learn and experience a different perspective on the same issues and exchange views. It can be emphasized that the diversity of learners, teachers, and practitioners can become a strong asset for the sustainable development of competences in the digital age.

In addition, acquiring intercultural and cross-border professional competences are the basic conditions for greater social mobility. They give residents of the supported area the opportunity to exchange knowledge and jointly develop ideas, thanks to which the transfer of services and employees contributes to the economic development of partner countries.

In turn, the „*Start Time 2024*” training and career fair offered students and potentially interested young people an interactive channel to the local and cross-border business entities to join the cooperation possibilities and build connections within a diverse network. Undoubtedly, various formal and non-formal educational and training opportunities can affect the development of professional competences and transversal skills.

Based on this foundation, the „*Start Time 2024*” enabled access for interested students to potential employers and education institutions providing visitors with a wide range of opportunities for vocational training, internships, and development of competences for the future.

The study reveals that cross-border activities provided for the „*Education Connects*” project focus on practical training of professional competences and digitalization of the educational process. They should bring tangible results in the development of the required competences. However, it must be taken into account that sustainable development has to be more inclusive and disseminate good practices to meet the more diverse learners and local needs.

The findings presented in this study can be benefitted both for teachers practice at vocational education institutions and technical universities as well as for researchers as a source for further analysis and the relevance of activities supporting the sustainable development of professional competences in the digital age.

A future research direction could be comparative case studies in the area of vocational education practice using digital solutions and artificial intelligence in order to explore and disseminate good practices as well as identify gaps and areas requiring improvement.

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