Annals of
Reviews and Research

Juniper Publishers
key to the Researchers

Review Article
Volume 4 Issue 2 - October 2018

Ann Rev Resear

Business Transformation Towards Digitalization and Smart Systems

Gabriel Vladut*

IPA-SA Craiova, Romania

Submission: September 03, 2018; **Published:** October 26, 2018

***Corresponding author:** Gabriel Vladut, IPA-SA Craiova, Romania, Email: office@ipacv.ro

Abstract

For easing the Business Transformation and to keep pace with the rapid digital developments by sensitization, potential determination, assessment of existing structures and processes, tailor made blended learning modules for training of employees and managers of SMEs. Impaired impact: Transformation of SME to the developments in the digitalization and smart systems to gain competiveness and profit. There is no digitalization and no digital transformation without digitization (of paper and processes). Digitization is used in many contexts it is very often confounded and/or interchangeably used with digitalization. So, what is digitization? Digitization and digitalization are two conceptual terms that are closely associated and often used interchangeably in a broad range of literatures. There is analytical value in explicitly making a clear distinction between these two terms. Digitization is used in several meanings as said but for me it has two meanings which are closely related with each other.

Entrepreneurship key competence refers to an individual's ability to turn ideas into action. Entrepreneurship formation should offer students tools to be creative, to solve problems efficiently, to analyse a business idea objectively, and to communicate, cooperate, lead, develop and evaluate projects. Formation must be at the core of society's response to these powerful forces. Innovations and corresponding skills should be used in all sectors of education and training, because technology skills are essential for global citizenship.

Keywords: Entrepreneurship formation; Business transformation; Digitalization; SMART systems; Innovation

Introduction

Innovation involves the utilization of new formation or a new use or combination of existing knowledge. New knowledge may either be generated by the firm during its innovation activities (i.e. through intramural R&D) or acquired externally through various channels (e.g. purchase of new technology, utilization of IT resources). The use of new knowledge requires innovative efforts that can be distinguished from standardized routines". (OECD, 2005). The transition from an industrial to a knowledge-based society and the short-time adjustment of knowledge, competences and skills for new business should change also entrepreneurship education. Changes in work and living conditions, digitalization progress and societal change require adapted education forms, life-long learning new concepts, providing more and more short-termed, and new structural answers. Besides different approaches to modernize and improve EE, social innovation is becoming prominent in policy, scientific and public debates in Europe and global. For a fair and accurate analysis of how to develop the concept of digitization in companies and in society, how to form the new utilizations, we needed to know the initial situation [1-2].

a. Technological change has a strong impact on daily work

b. Manufacturing processes change rapidly

c. The networking of systems and applications is increasing

d. Teams are increasingly working virtually

e. Higher customer requirements (new business models/ service offers, personalization of products (batch size 1), short delivery times)

f. Results of the study "vocational training trends in Germany 2017" show:

g. Digitalization has reached companies at all levels of qualification.

h. In order to be prepared for the digital transformation, companies need employees with versatile digital skills.

i. Training portfolios in companies are still far from meeting digital requirements

j. Under these circumstances, we launched a European project BITTMAS "Business Transformation towards digitalization and smart systems", on the Erasmus + program, with partners from: Germany, Ireland, Spain, Austria, Turkey and Romania, representing both the university, research and innovation environment, as well as the business environment, professional associations, Chambers of Commerce and Industry, with several goals:

k. Raising awareness of the digitalisation of SMEs in particular (micro-enterprises, SMEs; up to 249 employees; max. annual turnover EUR 50 million; according to the recommendation of the EU Commission dated 6 May 2003)

l. To improve vocational training offers for digitalisation

(on their own initiative) for all qualification levels (from apprentices to senior management)

m. Reduce the gap between awareness of Industry 4.0 and digitalisation and actual initiative, especially among SMEs.

n. Recognizing the potential of digitization (potential analysis, self-assessment)

o. Close knowledge gaps (library, media library, glossary)

p. Showing the implementation approach (roadmap, use cases)

q. Provision of training modules for companies to use the BITTMAS tools and concepts on their own initiative

Objectives addressed:

a. **A more modern, dynamic, committed and professional environment inside the organization:** Intelligent products, high customization of products, flexible production, highly qualified professionals formed wide, demographically-sensitive job design, individualization of customer requirements are tags of Industrie 4.0.

b. The society is on the way with large steps to the 4th industrial revolution. This announces a technologically advanced industry by means of complex cyber-physical systems, distinguishing between intelligent products and beyond smart factories.

c. In this area employees are in a new business model working with digital tools, networked worldwide, handling the data on cloud systems, using agile project management methods and create smart individual products and flexible intelligent factories.

d. 84% of the companies face a pressure for digitalization within their industry.

e. The availability of information throughout all business processes and the entire life cycle of products are of critical importance, because all the SME are under pressure to make use of the ongoing digitalisation.

f. Flexible (responsive to changes).

Increased capacity and professionalism to work at international level using the potential of digitalization and smart system by transforming the business: To determine the existing potential, assess existing structure and processes as well as to create a tailor-made roadmap combined with the required knowledge to transform it into business profit and competiveness needs a huge amount of data and skills and requires five levels of action:

a. Sensitization of SME management and staff

b. Potential determination for new business solutions

c. Structured assessment of existing structure and processes

d. Knowledge building with tailor made learning module

e. Road-map development and knowledge deployment to transform it into SME's competiveness

a. Increased sense of initiative and entrepreneurship: Most of the SME are not yet aware of the implications if they are not prepared for the Business Transformation required because of the further digitalization in all spheres of life.

b. Increased sense of initiative and entrepreneurship of owners, managers and staff can only be expected if sensitization and tailor-made measures are applied with the companies.

a. Improved levels of skills for employability and new business creation: Improved levels of skills and the upgrading of competencies for new business creation will only succeed, if specific solutions for the environment each company/ case is developed.

b. The need for more digital skills with regard to Business Transformation/Processes with employees will help them to stay in work and will be decisive to create new businesses and products.

a. Increased opportunities for professional development: Extended digital competencies will lead to increased productivity in processes and higher market value of the individuals with regard to job opportunities.

a. Increased motivation and satisfaction in their daily work: Decision-making reliability through extended competencies leads an increased motivation and work satisfaction based on process security.

In order to identify the real problems of the target group / companies, a market survey was carried out in each of the represented countries and we made a necessary science.

The following market needs were identified:

a. Industry is one of the pillars of the European economy - the manufacturing sector in the European Union accounts for 2 million enterprises, 33 million jobs and 60% of productivity growth.

b. The European industry needs to explore the future potential of ICT, automation, sustainable and clean as well as human-centered manufacturing and processing technologies.

c. According to Oettinger areas like big data, the internet of things, cyber-physical systems and robotics offer great opportunities for industry.

d. In order to seize them, there is urgency for acting fast, at the right scale and jointly at the European level.

e. Industry in Europe has assets to build on leadership in industrial robotics and factory automation, enterprise software or 3D- and laser-based manufacturing

f. At a recent roundtable in Brussels on the Digital Transformation of Industry, hosted by Gunther Oettinger, EU

How to cite this article: Gabriel Vladut. Business Transformation Towards Digitalization and Smart Systems. Ann Rev Resear. 2018; 4(2): 555634.

Commissioner for Digital Economy and Society, European business leaders to discuss ways to energize the digital transformation of Europe's industrial sector.

g. Across Europe, digitalization raises the potential for increasing flexibility, efficiency, productivity, competitiveness - all helping to create jobs and growth.

h. Top priorities are small and medium-sized enterprises. After all, Europe is a continent of SMEs - where nine out of 10 companies are SMEs and, two out of three jobs are in SMEs.

i. They have to be part of the digital journey; they are crucial to Europe´s growth and competitiveness

Obtained results; next steps

Until now we have completed the following modules of the training system provided:

a. Methodology to determine the potentials for new business solutions

b. Tool Box (Figure 1-4).

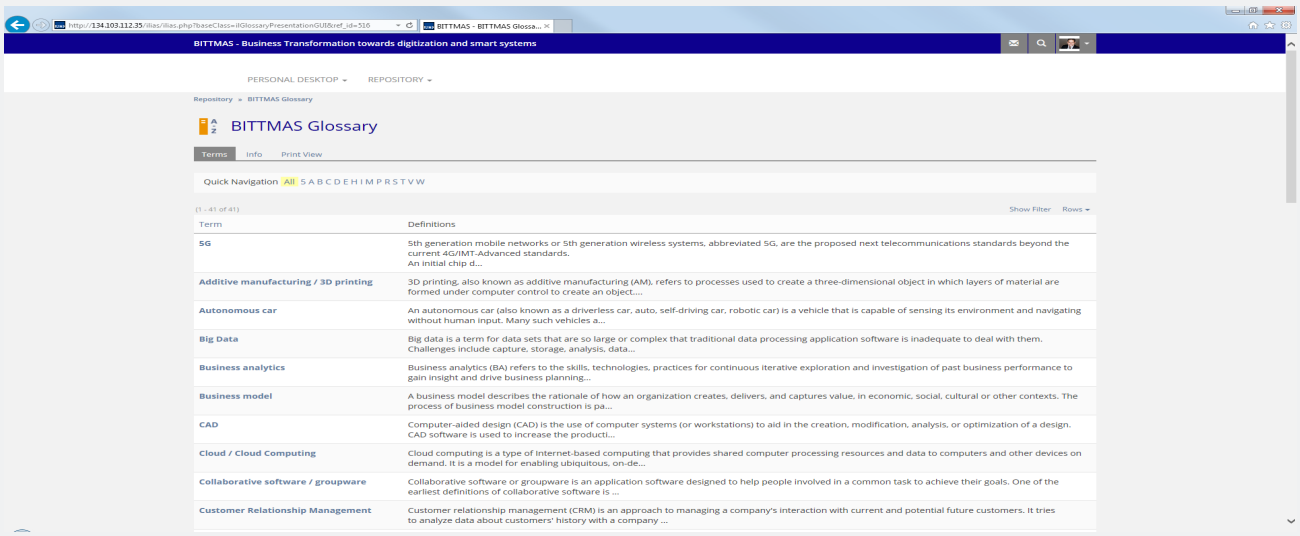

Figure 1: BITTMAS glossary (definitions digitalization).

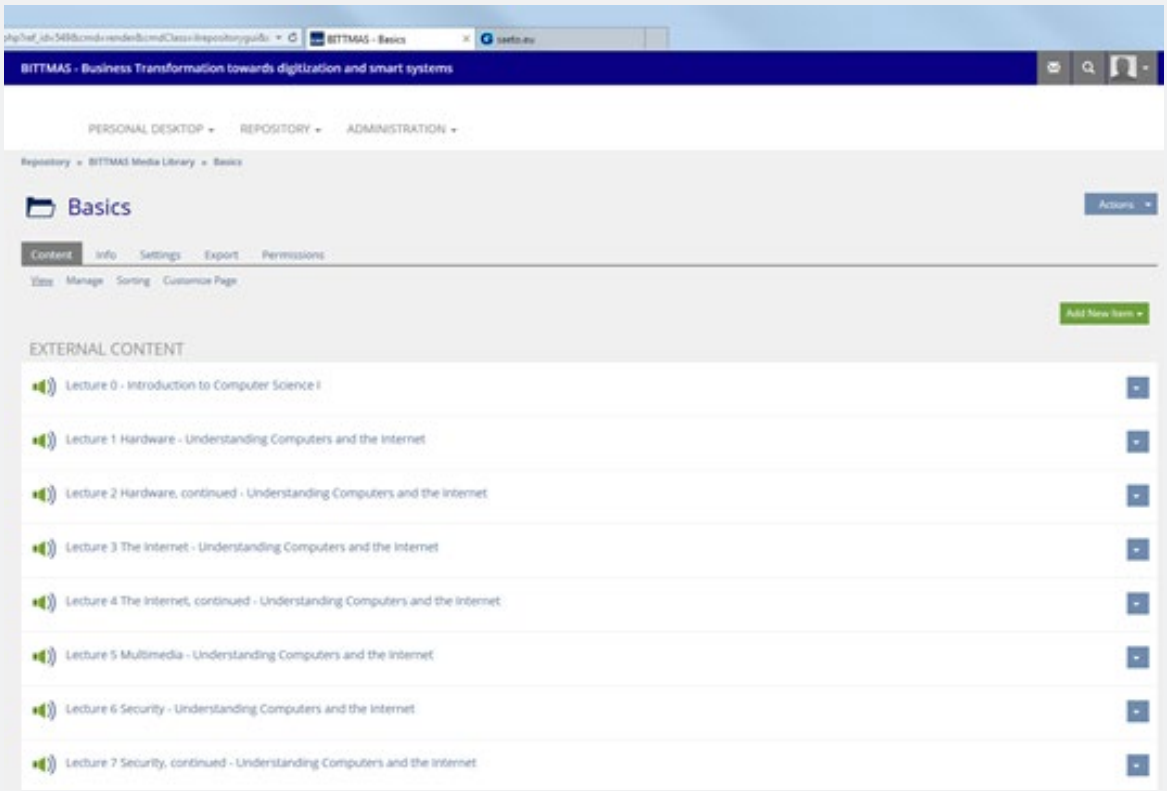

Figure 2: BITTMAS library (Basic and specialized knowledge in digitalization).

How to cite this article: Gabriel Vladut. Business Transformation Towards Digitalization and Smart Systems. Ann Rev Resear. 2018; 4(2): 555634.

			Answer a = Level 0; Answer b = Level 1; Answer c = Level 2; Answer d = Level 3	9 Predictive maintenance
	D1 - Enabling Technology			
DM1	**Mobile devices to provide information to employees**	**Do you utilize mobile devices to provide digital information to shop floor workers in decentralized and individualized manners?** (e.g. Existence of virtual reality glasses to provide step-by-step manuals for	a (Level 0): Employees are not or only occasionally equipped with mobile devices such as smart phones or tablets (or similar) b (Level 1): Employees are broadly equipped with mobile devices such as smart phones or tablets (or similar) c (Level 2): Employees are equipped with mobile devices if practically possible such as smart phones or tablets (or similar) d (Level 3): Additionally to Level 3 employees are equipped with high end technology such as virtual reality technology	
DM2	**Auto-ID-Technology for physical objects**	**Do you utilize technology to track and identify physical objects such as material, parts and products through the value creation process?** (e.g. Attached RFID-Chips on all work pieces to track, identify and protocol their status automatically and individually)	a (Level 0): There is no Auto-ID-Technology implemented on material, parts or products (only passive ID-Technology such as etiquettes or QR-Codes) b (Level 1): Occasional implementation of Auto-ID-Technology on material, parts or products c (Level 2): Widespread implementation of Auto-ID-Technology on material, parts or products d (Level 3): All physical objects are equipped with Auto-ID-Technology	
DM3	**Existence of sensors to collect data about processes and/or infrastructure**	**Do you make use of integrated sensors to detect and monitor the process and/or machine status in real time and to collect data for further analysis?** (e.g. Integrated sensors in all machines to measure temperature, humidity, vibrations for further data analysis and derivation of a data based	a (Level 0): There are no sensors along processes or within infrastructure to collect data conditions and performance b (Level 1): Occasional existence of sensors along processes or within infrastructure to collect data about the current condition c (Level 2): Widespread existence of sensors along processes or within infrastructure to collect data about the current condition d (Level 3): All processes or infrastructure is equipped with sensors to collect data about the current condition	c (Level 2)
	D2 - Data & Information			
DI1	**Digital Information**	**To what degree does company related information exist in a digital form?** (e.g. Analogue information is digitized as a standard company procedure and is processed and distributed only in digital form)	a (Level 0): The majority of all information exists in analogue and location-dependent form e.g. on paper, on signs, on boards (or similar) b (Level 1): The majority of all information exists in digital but location dependent form e.g. on local computers (or similar) c (Level 2): The majority of all information exists in digital and location-independent form e.g. cloud-based servers (or similar) d (Level 3): The existence of only digital and location independent information is defined as a company standard	
DI2	**Automated data collection along processes**	**Do you collect relevant data in productionautomatically through sensors and related software?** (e.g. Collection of machine data through integrated sensors or identification of work piece handling using RFID-data and wifi-transmission)	a (Level 0): In general no or little data collection in processes or no existence of sensors b (Level 1): Occasionally automated data collection in processes c (Level 2): Automated data collection during the majority of all process steps d (Level 3): Automated data collection during all process steps	c (Level 2)
DI3	**Analysis of collected data**	**Do you analyse collected data to generate relevant information?** (e.g. Correlation of collected production quality data with weather data to evaluate effects of weather on production quality)	a (Level 0): Collected data is not analysed further to generate relevant information or there is no data collection b (Level 1): Collected data is occasionally analysed further to generate relevant information c (Level 2): Collected data is extensively analysed further to generate relevant information d (Level 3): Existence of a standard procedure to analyze all collected data further to generate relevant information	c (Level 2)
DI4	**Data driven decision making**	**Do you use generated information for data-driven decision making?** (e.g. Production planning is based on collected and analyzed data about future sales forecasts)	a (Level 0): Company decisions are mostly based on subjective views and personal experience, or there is no information generation b (Level 1): Company decisions are partially based on collected and analyzed data c (Level 2): Most company decisions are based on collected and analyzed data d (Level 3): All decisions within the company have to be supported with a concrete data basis	c (Level 2)
DI5	**Automated information provision**	**Do you distribute relevant information to employees automatically?** (e.g. Automated distribution of individual job descriptions coming from an MES to the shop floor workers if they sign in at the working station)	a (Level 0): All information is provided to the employees manually / there is no digital information b (Level 1): Occasionally automated provision of information to employees c (Level 2): Broadly automated provision of information to employees d (Level 3): All information is provided to employees automatically	
DI6	**Individualization of information provided to employees**	**To what degree do pasadjust provided information to situative context, employees tasks and competencies?** (e.g. Utilization of virtual reality glasses to constantly visualize all manufacturing steps in real-time)	a (Level 0): Provided information to employees is mostly not adjusted to worker's task or competencies b (Level 1): Provided information to employees is mostly adjusted to the worker's task but not to the workers competences c (Level 2): Provided information to employees is fully adjusted to the worker's task and occasionally the workers competences d (Level 3): Provided information to employees workers is fully adjusted to the worker's task and fully adjusted the workers competences	
	D3 - Value Creation Processes			
DM4	**Maintenance & care**	**Do you make use of sensors and derived information for asset maintenance purposes?** (e.g. Big data analytics of collect sensor data from production machines and determination of a maintenance strategy)	a (Level 0): No maintenance base on collected sensor data / no sensors available / no data collected b (Level 1): Asset maintenance strategy is reactive, based on machine constitution. c (Level 2): Asset maintenance is proactive. d (Level 3): Asset maintenance is prescriptive.	c (Level 2)
	D5 - Customers & Partners			
DM5	**Horizontal integration with suppliers/ customers along supply chain**	**To what degree are you integrated with your partners regarding digital and automated exchange of information?** (e.g. Utilization of apps for fast communication with suppliers regarding the delivery status of raw-material, Electronic Data Interchange for automated re-order, shipping notification or invoicing, ...)	a (Level 0): Partner communication occurs mostly in analog manners e.g. face to face, desk-telephone or paper based (or similar) b (Level 1): Partner communication occurs punctually in digital manners - additionally to Level 1 mobile phone, e-mail (or similar) c (Level 2): Partner communication occurs mostly in digital manners - additionally to Level 2: online-customer platform, smart phone apps (or similar) d (Level 3): Partner communication occurs fully digitalized - additionally to Level 3: transactions take place automatically	

Figure 3: BITTMAS maturity model (Basis for potential analysis and roadmap).

Figure 4: BITTMAS DigiPotAS (potential analysis).

Based on the self-assessment and the generated roadmap, the company can take measures and make investments to implement predictive maintenance in line with the gaps (difference to the highest level) identified. (Base on the presentation of Jörg Bauer, Dipl.-Kfm. (Univ.), Hochschule Reutlingen, Conference, Leipzig, 2017) [3-5] (Figure-5,6).

How to cite this article: Gabriel Vladut. Business Transformation Towards Digitalization and Smart Systems. Ann Rev Resear. 2018; 4(2): 555634.

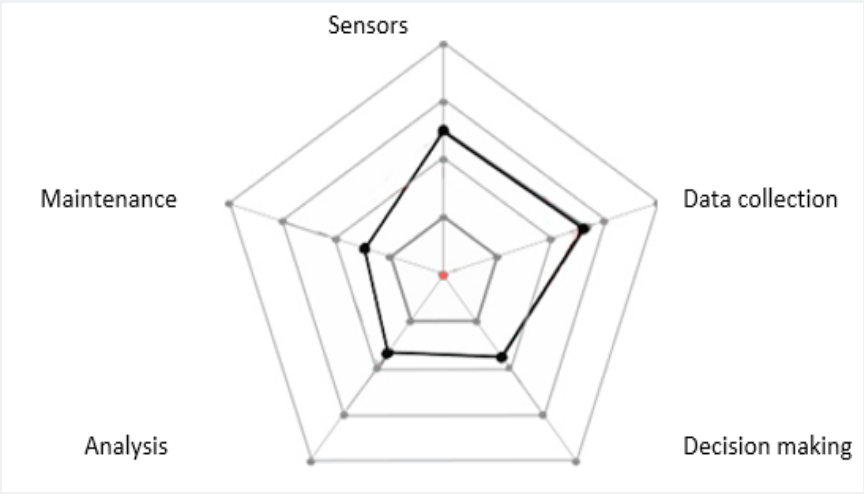

Figure 5: Methodology to develop a roadmap and derive the necessary measures.

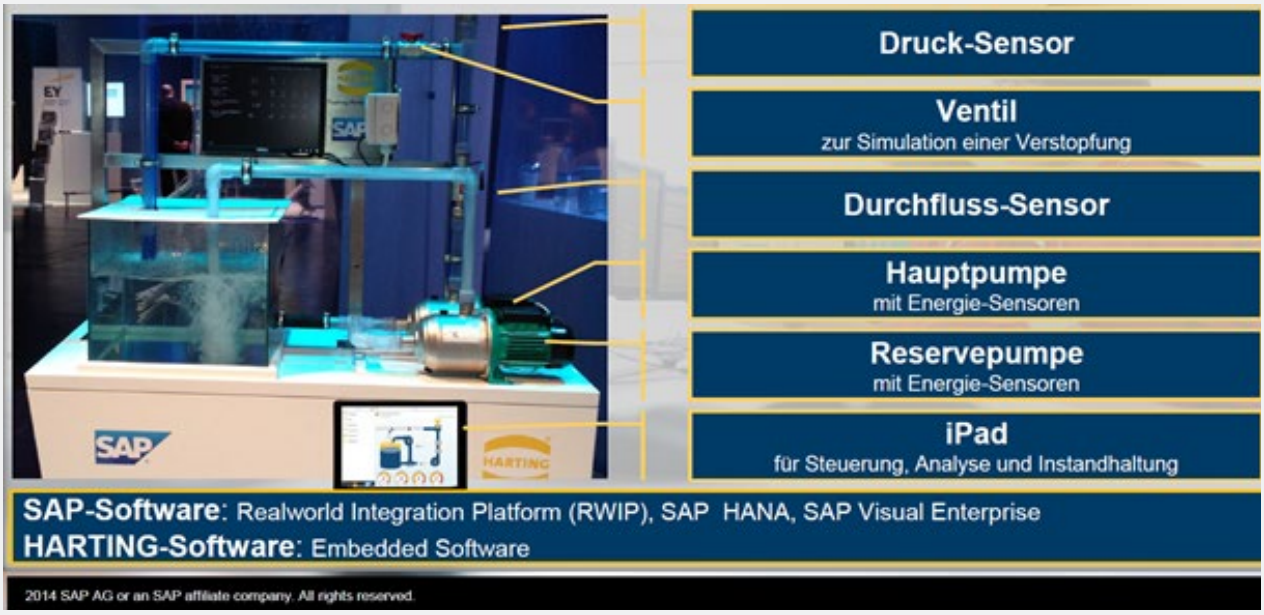

Figure 6: BITTMAS Use Cases.

a. Training modules to provide knowledge in regard to digitalization and smart systems, to support the implementation and running of the developed assessment and training solution.

a) Digital twin of the facility

b) Digital twin of the assets

c) Connected Company

d) Decentralized & Flexible value creation

e) Digital Assistant systems

f) Technical Assistant systems

g) Integrated transparent value chain

h) Autonomous intralogistics

i) Predictive maintenance

j) Data Driven Decision Making

k) Data-enabled resource Optimisation

l) Track and trace

m) Smart Product

n) Digital Human Resources Management

o) Digital Marketing

p) Digital Procurement

q) Cyber Security

r) Informatics systems in the automotive industry

In the next period we aim to achieve the following modules of the training system provided:

a) Roadmaps

How to cite this article: Gabriel Vladut. Business Transformation Towards Digitalization and Smart Systems. Ann Rev Resear. 2018; 4(2): 555634.

b) Training modules

c) Translations into the national languages of the partners

d) Workshops/Training Partners

e) End User tests

f) Validation/Fine tuning

g) Videos Testimonials

Conclusion

To face the challenges of remaining fit for the future, other countries have been developing strategies to build their industries to a level where they can compete within the global economy in the years to come. Most relevant for the Netherlands is the German Industry 4.0 initiative, but Belgium, Denmark, the United States and South Korea are also developing their own manufacturing strategies. In the Netherlands, this strategy is called "Smart Industry". Digitalization has increasingly become an important communication tool for conducting business. Well-designed and properly maintained systems expedite business communications, create trust, efficiency and competitiveness and automate routine business tasks.

Entrepreneurship is the art of to be able to turn ideas into action. This implies creativity, innovation, risk taking, and the competence to plan and manage projects in order to achieve proposed objectives.

If the vision of Industry 4.0 is to be realized, most enterprise processes must become more digitized. A critical element will be the evolution of traditional supply chains toward a connected, smart, and highly efficient supply chain ecosystem. The supply chain today is a series of largely discrete, soloed steps taken through marketing, product development, manufacturing, and distribution, and finally into the hands of the customer.

Digitization brings down those walls, and the chain becomes a completely integrated ecosystem that is fully transparent to all the players involved - from the suppliers of raw materials, components, and parts, to the transporters of those supplies and finished goods, and finally to the customers demanding fulfillment. This network will depend on a number of key technologies: integrated planning and execution systems, logistics visibility, autonomous logistics, smart procurement and warehousing, spare parts management, and advanced analytics.

The result will enable companies to react to disruptions in the supply chain, and even anticipate them, by fully modeling the network, creating "what-if" scenarios, and adjusting the supply chain in real time as conditions change [5-9]. The entrepreneurship competence is relevant not only for those who would like to start/carry up a business but for all who would like to be competitive and efficient, to support changes in individual, collective, economic and social environments. It is necessary to consider formation, education, entrepreneurial culture, digitalization and personal formation, on each stage of development of eco-innovation models. The development models should work in innovative eco-systems, and functional complex that creates competitiveness, efficiency and added value. Entrepreneurial training and digitization are not two different components of the road to competitiveness but complementary components, which should be approached unitarily in the process of creating an efficient entrepreneurial culture.

Once built - and the components are starting to be developed today - the digital supply "network" will offer a new degree of resiliency and responsiveness enabling companies that get there first to beat the competition in the effort to provide customers with the most efficient and transparent service delivery.

References

1. Ileana Hamburg IAT, Gabriel Vladut (2018) Entrepreneurship education in economy and social innovations. SA Craiova, Romania, Forum for Innovation, Bucharest.
2. 2017 TNS Infratest/Studiengemeinschaft Darmstadt; Studie „Weiterbildungstrends in Deutschland.
3. Digital Agenda.
4. Hamburg I, Vladut G, OBrien E (2018) Fostering skills for digital social innovations in entrepreneurship education. 8th Balkan Region Conference on Engineering and Business Education and 10th International Conference on Engineering and Business Education, Sibiu, Romania.
5. Jörg Bauer, Dipl Kfm (2017) Hochschule Reutlingen, Conference, Leeipzig.
6. 2017 IDC, Digital Transformation in Central and Eastern Europe, survey of enterprises with 250+ employees in five key countries, August and September.
7. Schröder A, David A, Hamburg I (2018) Creating spaces for innovations in education and lifelong learning. In: Howaldt J, et al. (Eds.), Atlas of social innovation: new practices for a better future. Dortmund: Technische Univ, Sozialforschungsstelle pp. 169-171.
8. 2016 High Tech Systems & Materials, Roadmap Smart Industry.
9. Stefan S, Berttram P (2016) Industry 4.0: How digitization makes the supply chain more efficient, agile, and customer-focused.

How to cite this article: Gabriel Vladut. Business Transformation Towards Digitalization and Smart Systems. Ann Rev Resear. 2018; 4(2): 555634.