



DISCUS

***Digital Transformation in the construction sector:
challenges and opportunities***

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EUROPEAN PRELIMINARY REPORT

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EU REPORT: INTRODUCTION

CONSTRUCTION SECTOR

ENERGY AND JUST TRANSITION

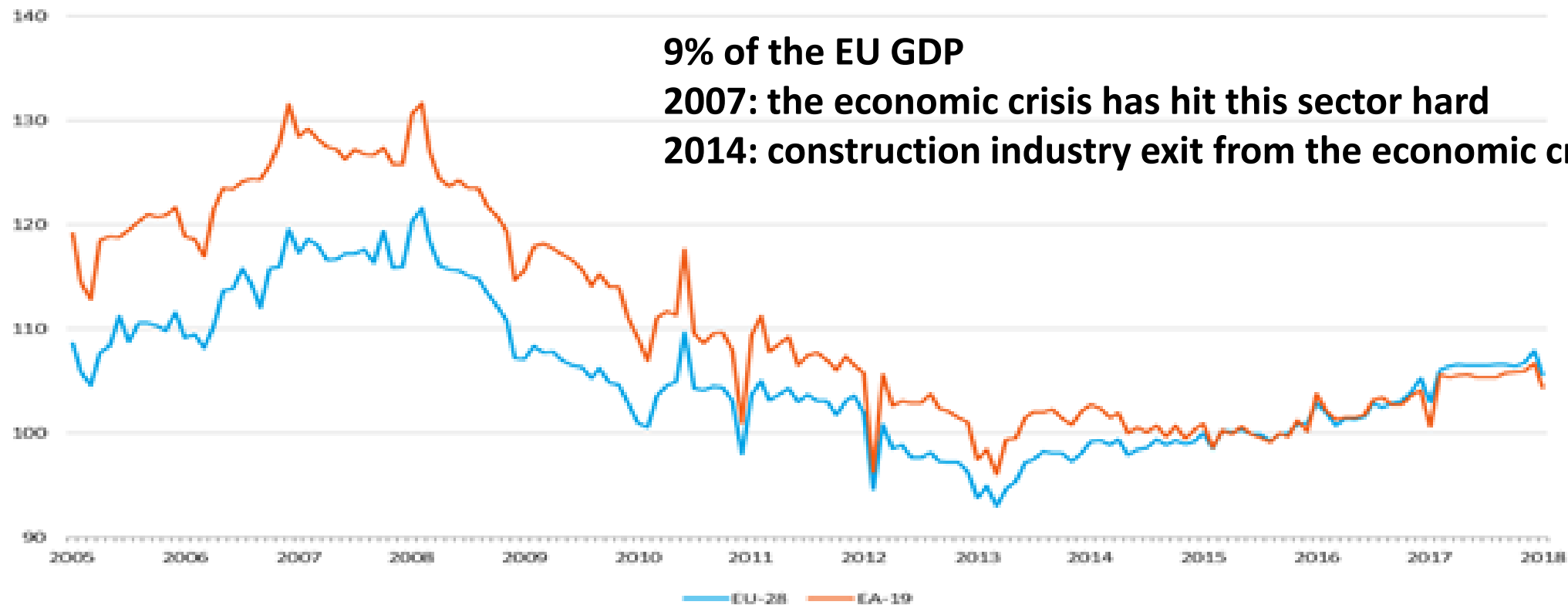
INNOVATION, DIGITALIZATION, INDUSTRY 4.0

INDUSTRIAL RELATIONS AND SOCIAL DIALOGUE



THE CONSTRUCTION SECTOR: MAIN CHARACTERISATION

EU-28 and EA-19 Construction production 2005 - 2017, calendar and seasonally adjusted data (2015 = 100)

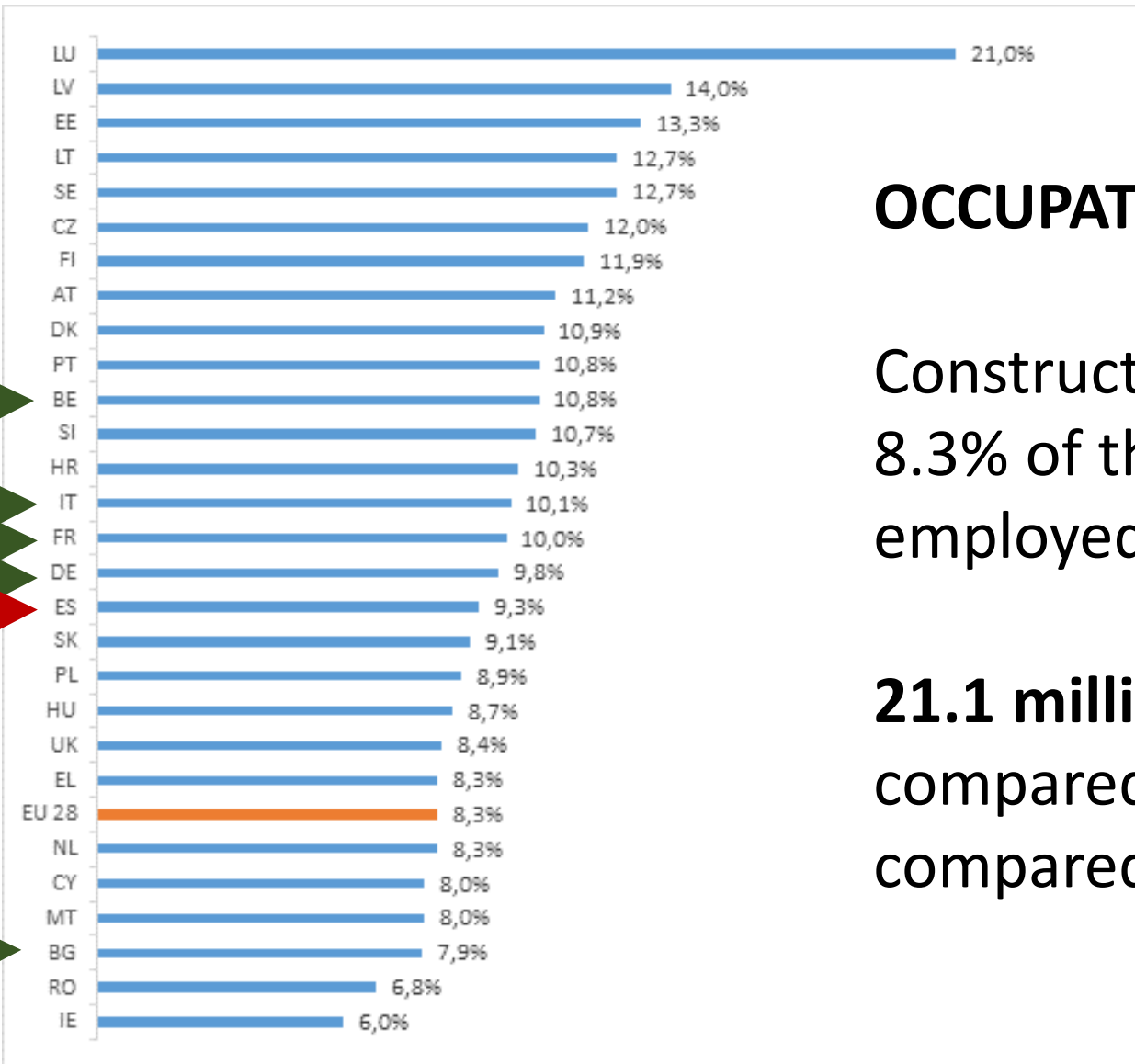


Source: Eurostat (online data code: sts_copr_m)



THE CONSTRUCTION SECTOR: MAIN CHARACTERISATION

Occupation in construction sector in the total economy in 2016 – Eurostat 2017



OCCUPATION:

Construction-related industries account for 8.3% of the total number of persons employed in the EU overall economy.

21.1 million people: an increase of 3.4% compared to 2014, but a decrease of 11.8% compared to 2008 (ECSSO, 2017)



EUROPEAN POLITICAL FRAMEWORK

ENERGY:

Building sector is one of the **key consumers of ENERGY** in Europe: built environment accounts for around 40% of EU energy consumption and 36% of total greenhouse gas emissions.

Energy Performance of Buildings (Directive 2002/91/EC & 010/31/EU) minimum-cost optimal-energy performance requirements for new buildings and spheres of activities to reduce the energy consumption.

EU Strategy for the sustainable competitiveness of the construction sector (COM/2012/433)

EU Research and demonstration programme Energy-Efficient Building

EU Action Plan “Construction 2020” (2012)

ECONOMICAL AND TECHNICAL:

Late Payment Directive (Directive 2011/7/EU) provisions: period for payment by p.a.

Construction Products Regulation (Regulation (EU) No 305/2011) common technical language for assessing the performance of construction products



EUROPEAN POLITICAL FRAMEWORK

DIGITALIZATION:

Europe 2020 strategy for smart, sustainable and inclusive growth (2010)

Strategy for the Digital single market (DSM) (2015)

Industrial Digitisation Strategy (DEI) (2016)

European Platform of National Initiatives on the Digitisation Industry

Germany: “Industrie 4.0”

Spain, “Industria Conectada”

Italy: “Industria 4.0”

France: “Alliance pour l’Industrie du Futur”

Netherlands: “Smart Industry”

While for ENERGY and SUSTAINABILITY there are many specific interventions for the Construction sector

DIGITALIZATION AND INNOVATION for the Construction sector are part of a wide set of actions related to the whole innovation of the national and EU economy.



MAIN CHARACTERISATIONS OF THE SECTOR

MICRO and SMALL FIRMS

91.9% of more than 3 million companies have less than 10 employees.

Small and medium construction enterprises employ 83% of the total workforce of the sector

Construction sector is an area typically dominated by men; female incidence: 7.5% (ILO, 2015)

Migration (low and high skilled)

Black economy and irregular work

Average age of construction workers is increasing and low attractive for young people

Decrease in the number of young skilled workers in the sector

Low-skilled workforce (Eurostat, 2017)

BUILD UP Skills reports (EC, 2016): labour shortage. Many employers have difficulties to find qualified workers (EC, 2016b) due to changing skills requirements.

STRUCTURAL BARRIERS FOR INNOVATION



DIGITALIZATION OF THE CONSTRUCTION SECTOR

Low digitalization of the construction sector

Second least digitized after agriculture (ECSO, 2017)

Digital Transformation Scoreboard survey (2018):

- **91.3%** of leading construction companies say they are **aware of the potential of digital technologies.**
- **32.6%** of respondents believe that the availability of new technologies represents an operational **risk for their company**
- **Less than 6%** of construction companies **use digital planning tools,**
- **81%** of European construction operators said they are **not ready for the advent of digitisation**



INNOVATION AND VALUE CHAIN

Construction value chain is a network of multi organizations

(Hu, 2008; McKinsey, 2015; Liu, Chua, 2016)

Digital processes and technological innovation are intervening on the value chain

- **Research & Development:** products, processes and building materials
- **Planning:** project
- **Logistics:** flow of goods, storage and transportation
- **Procurement:** purchasing, supplier management and supplier evaluation
- **Production/Construction:** on site / off site
- **Marketing/Sales:** Sales/dealer management
- **After sales/end-customer marketing:** Pull marketing, user support, services, maintenance

Transition from a linear to a **circular economy** means a paradigm shift in the definition of products and processes that must be managed and monitored throughout their life cycle (Ellen MacArthur Foundation 2015)



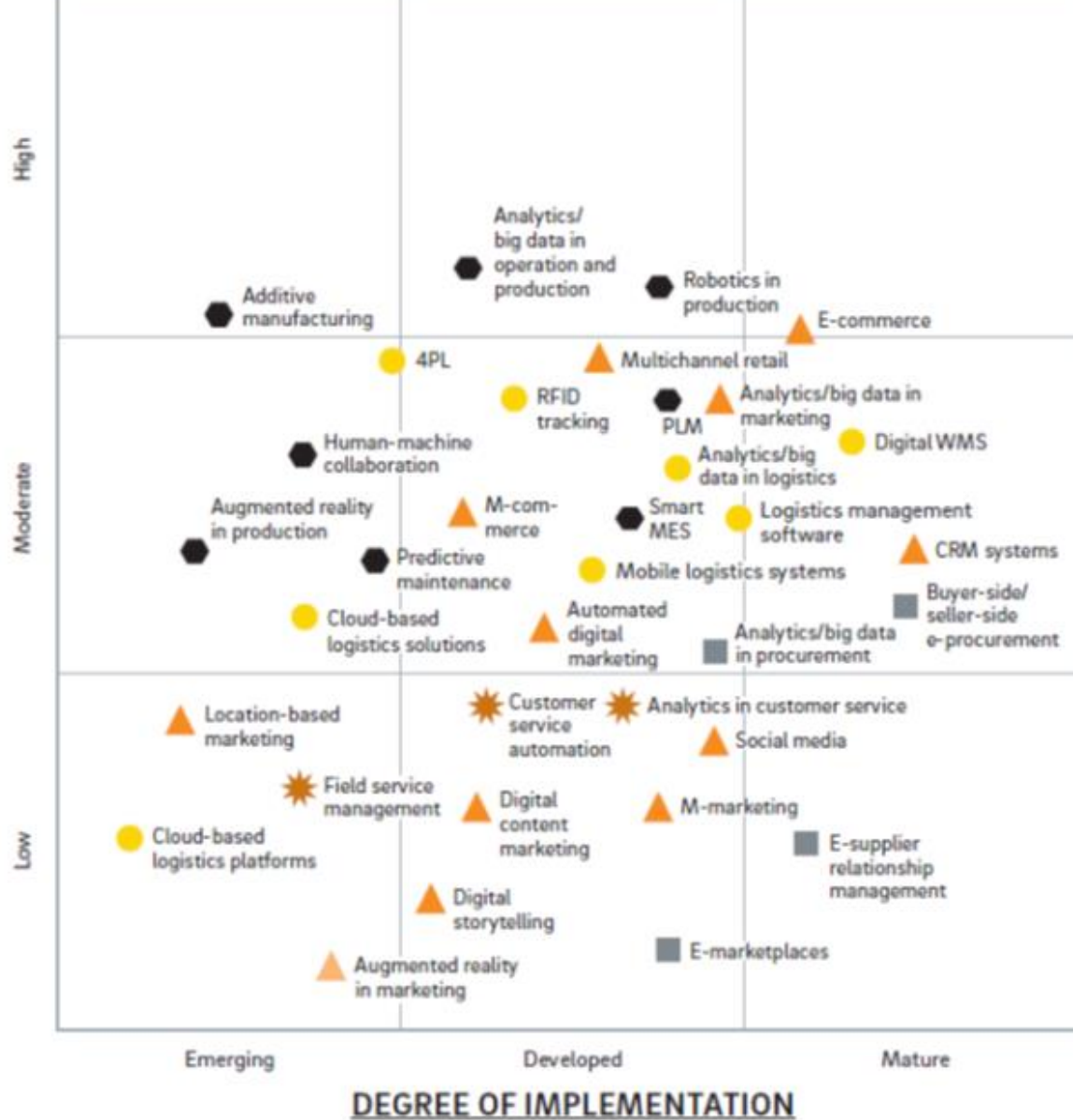
DIGITALIZATION AND INNOVATION

BPIE report (2016) : four specific opportunities for industrial innovation construction

Prefabricated systems for deep energy retrofit of residential buildings	<ul style="list-style-type: none">- Customization of prefabricated elements by project;- Robotics, 3D scans and simulations to measure the building and perform perfect assembly;- New cooperative business models between design, production, assembly and customers;- Third parties to aggregate the restructuring projects.
Advanced building envelope insulation materials	<ul style="list-style-type: none">- Evolution from a single material or product to a system solution that includes fixings, finishes;- System solutions that reduce labour costs;- Guidelines for design and execution, training, etc., bringing superinsulating materials to the relevant actors in the construction value chain.
Interaction of the building with the energy system	<ul style="list-style-type: none">- Third party business models that aggregate the interactions of buildings with the energy system;- Communication interface and orientation program customized according to the needs and desires of the building occupants;- Intelligent controls and appliances that allow building occupants to modulate their energy use.
Building Automation and Control Technologies	<ul style="list-style-type: none">- Organizational and service innovation to overcome the mismatch between the construction sector and building automation to optimize energy consumption with dynamic and self-learning control systems;- Innovative product solutions that integrate building automation into existing buildings;- Innovation marketing to raise awareness among architects, installers and end users of the potential for energy savings and other benefits such as safety and comfort.

DIGITALIZATION AND INNOVATION

INFLUENCE ON BUSINESS



Legend: Procurement (grey square), Logistics (yellow circle), Production/construction (black circle), Marketing and sales (orange triangle), After sales/end-customer marketing (orange star)

Source: Desk research, interviews, Roland Berger

Source: «Think Act»,
Digitization in the Construction Industry, 2016

Many innovation processes:

Lean production Systems

Design for Manufacture and Assembly (DFMA)

BIM Building Information Modelling
Process of Management of information related to the Life Cycle of Buildings involving, in the various phases, all the actors related to the Building Process: Clients, Designers, Builders, Managers



INDUSTRIAL RELATIONS AND SOCIAL DIALOGUE

Eurofound (2015)

1. HIGH LEVEL OF FRAGMENTATION AND DIVERSIFICATION

At the national level, there is considerable pluralism in the associative systems of both labour and business. This high fragmentation of associations results from the strong differentiation of sectors that characterizes the sector

2. LOW TRADE UNION DENSITY

Trade union density in the sector tends to be relatively low, mainly due to high labour turnover and the high incidence of non-standard and migrant labour.

3. POLARISED COVERAGE OF COLLECTIVE BARGAINING

Collective bargaining coverage is highly polarised. High collective bargaining coverage is found almost exclusively among the **"old" Member States** (with the notable exceptions of Hungary and Slovenia), while extremely **low rates are found in the Baltic States, Bulgaria and Poland**



INDUSTRIAL RELATIONS AND SOCIAL DIALOGUE

ETUI (2016), Work in the digital economy

Strengths	Opportunities
<ol style="list-style-type: none"> 1. Connected world, open systems, knowledge economy 2. Networks, exchange, sharing and collaboration, with access based on functionality rather than ownership 3. Integration of industries and services: intelligent factories, energy systems, mobility, transport and cities and “optimised” governance 4. Automation, robotisation, learning machines 5. Productivity, efficiency and profitability gains 6. Zero marginal cost economy 7. Innovative products and services, proliferation of mobile apps to “make life easier” 8. New autoproduction capacities, micro factories 	<ol style="list-style-type: none"> 1. New jobs 2. More “agile” work organisation; new forms of more flexible and more autonomous work 3. Abolition of repetitive and routine tasks 4. Better ergonomics, help in performance of heavy or complex tasks 5. New forms of collaboration and among workers 6. Reshoring or onshoring (return of industries and new “smart” factories – and jobs – to their country of origin) 7. Possibility of new ways of distributing productivity gains (workingtime reduction) 8. Possibilities of social emancipation, change of economic model geared to peer-to-peer and common goods (“post-capitalist” society)
Weaknesses	Threats
<ol style="list-style-type: none"> 1. Jobless growth, jobless future 2. Emergence of super powerful oligopolies, new world data masters 3. Concentration of power and wealth in value chains 4. Frequent problems of (non)-compliance with regulatory, administrative, labour and taxation standards 5. Protection of personal data exposed to intrinsic risks 6. “Algorithmisation” of individual behaviour, work and consumer habits, social and cultural preferences 7. Hollowing out of the middle classes and polarisation of society between a reduced number of “top-of-the-scale” workers and a mass of “bottom-of-the-scale” workers 8. Under-investment and under-utilisation of digital tools for the social emancipation of low-income sections of society 	<ol style="list-style-type: none"> 1. Massive destruction of medium-skilled jobs 2. Intensification of “anytime, anywhere” work; blurring of the boundary between private life and working life leading to stress and burnout 3. Loss of control by workers of their own expertise and know-how and free will 4. Digital management, policing of workers, risk of mutual loss of trust between employees and management 5. Precarisation of jobs and statuses, total dependence on “data masters” 6. Weakening of collective action and industrial relations 7. Skills and training/labour demand mismatch 8. Exacerbation of inequality, wage stagnation 9. “Digital Taylorism” and world competition among workers for all jobs not requiring face-to-face contact 10. Erosion of tax base and social insurance financing



INDUSTRIAL RELATIONS AND SOCIAL DIALOGUE

Multi-level governance of policies & multi-stakeholders social dialogue (ILO) in the CONSTRUCTION SECTORS (BROAD Project, 2017)

Just transition (ETUI)

a concept that was born in the context of the fight against climate change, but whose key principles are valid and relevant also to address technological change and the digitisation of the economy.

- Early research and assessment of the social and employment impact
- Social dialogue and democratic consultation of social partners and stakeholders
- Active policies and labour market regulation, including training and skills development
- Social protection, including the guarantee of pensions
- Community renewal and economic diversification plans
- Solid investments leading to high quality and decent jobs.



EU REPORT

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