15th Coming IT Conference

The Industry 4.0: From Linear to Exponential Value Chains

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Paradigm Change in Economics and Business Management

Thinking Digital in Industry 4.0
Conventional management propositions

- Management (macro, micro and political) always depends of:
  1. Finance (or money)
  2. Technology (or operations management)
  3. Psychology (or expectations)

- In previous interactions, Ideology plays catalyst role
Macro M and Micro M: Convergence

- Nominal vs. real
- Actual vs. potential

Output
Technology change

Money
Value mngt
Org. culture
Expectations

Inflation
Interest rates
Exchange rates

“Animal spirits”
“Irrational exuberance”
Rational expectations
New normalities after 2008

1. **Technology change:**
   - 2010: Industrial revolution 4.0 (*K. Schwab*)
   - 2011: *Industrie 4.0* (Germany)

2. **Social context:**
   - Deglobalization along with new globalization
   - Changes in demographics
   - Urbanization
   - Middle class expansion
   - Fierce competition for finite natural resources
   - Rise of peripheral economies and decline of core economies
   - Emergence of fundamentalism and non-state actors
Paradigm change in Industry 4.0

• Technology progress is dynamic and cumulative process:
  – Theory of epidemics (S curve)

• Industry 4.0 was born in factory, marrying computer-programming automation with digital technologies Big Data (BD), Artificial Intelligence (AI), Internet of Things (IoT), Machine Learning (ML), cloud computing, broad band, Augmented Reality (AR), etc. on value chain:
  – Since its inception, advanced manufacturing principles spread inside the value chain and beyond the factory walls
  – New normality are double amalgams of breakthroughs from cyber world and physical (or biological) world as well as products and services fully growing together

• After 2010 paradigm change in business environment:
  – „Innovate, innovate, digitalize, and connect or go away from the scene“

• In Industry 4.0 technology is not always friend:
  – Disruptive innovations (C. Christensen)
History of Technology Progress

Modified according to: Growth of World Population and the History of Technology, Robert Fogel/University of Chicago
World population trend

![Graph showing world population trend from 1700 to 2015. The population has increased dramatically, especially after 1800.](image-url)
IR 4.0: Disruptive innovations
Why now?

• The Great Recession 2008 demystify neoliberal growth model and economic policy platform (the *Washington Consensus*) emphasizing:
  – Securitization
  – Financialization
  – Deindustrialization
  – Income inequality
  – Environmental degradation

• **Industrial revolution 4.0 (IR 4.0):**
  – Potential for exponential growth of production and performances
  – The most significant revolution in the anatomy and physiology of enterprise, competition, and economic policy platform

• **Changed social context embodied with new normalities:**
IR impact on Economics orthodoxy

- **IR 1.0:**
  - Free market and free entrepreneurship
  - Free goods
  - Fiat money

- **IR 2.0:**
  - Globalization of trade and investment
  - Stronger role of state in natural monopolies, infrastructure and network technologies
  - Mistreatment of externalities
  - Exogenous character of R&I

- **IR 3.0:**
  - New wave of globalization
  - Market fundamentalism
  - Deregulation of capital markets

- **IR 4.0:**
  - Deglobalization and new globalization
  - Unconventional macroeconomic policies (particularly monetary policy)
  - Rejuvenation of industrial policies
  - Endogenous character of R&I (open innovation)
IR impact on Economics heterodoxy

• IR 1.0:
  – No impact

• IR 2.0:
  – Technology transfer
  – Factor price control

• IR 3.0:
  – Industrial policies
  – Autonomous R&I

• IR 4.0:
  – Advanced Industrial policies
  – Globalization of trade and investment
  – Tendency toward the gold standard
Industrial policy rejuvenation

Manufacturing-led growth model

- Advanced manufacturing
- Science, education and health care
- Digital infrastructure
- High value added services

Vertical industrial policies

Strong macroeconomic policy regime

Horizontal industrial policies

- Sector with sustainable competitive advantage
- Sector with competitive advantage
- Sector with comparative advantage

Hard macro budget constraint
Hard micro budget constraint
Tax collection

Automatic stabilizers

Infrastructure upgrade
State procurement improvement
Affordable and clean energy supply
Start-up and scaling up
Trade and investment
Science and R&D
Balanced growth
Cluster development
Serbia’s priority sectors

SECTORS WITH PERMANENT COMPETITIVE ADVANTAGE
- ICT
- Organic food
- Health tourism

SECTORS WITH COMPETITIVE ADVANTAGE
- Metal industry
- Transport & logistics
- Wood & furniture
- Manufacturing

SECTORS WITH COMPARATIVE ADVANTAGE
- Agriculture
- Energy
- Automotive
- Fashion & design
- Waste mngt.
Industrial revolutions

1.0 Industrial revolution
- Steam machine
- Mechanical production
- 1784

2.0 Industrial revolution
- Assembly line
- Mass production using electrical energy
- 1870

3.0 Industrial revolution
- Programmable automation
- Advanced automation with IT
- 1969

4.0 Industrial revolution
- Remote management of value chain
- Cyber – physical/biological amalgams
- 2010

Capital Replaces Labour

Information Replaces Capital
IR 4.0: Mobility as a free good

DIGITALIZATION
Content & applications

GLOBALIZATION
Anywhere, anytime

INTERNET
Ubiquitous Access

MOBILITY
IR 4.0: Digital disruptions

• 636 global business leaders answered in 2017 that ”The change is already happening”:
  – Connected devices have thousands of times more computing power than the Apollo 11 spacecraft
  – There are almost 5 billion of mobile phone users

• But this does not mean that “neutron bomb” is operating:
  – For example, in the last 15 years 800 thousands jobs have been lost due to technology change, but 3.5 million have been created
Industry 4.0: Convergence of different technologies

• In IR 3.0 www enables convergence of computing and communications

• In IR 4.0 convergence is driven by different technologies:
  – Computing (Moore’s law)
  – Data analytics (BD)
  – Artificial intelligence (advanced manufacturing)

• In IR 4.0 tools of accelerations:
  – Cloud computing
  – 5G network: massive data speed (20 Gb) + near zero latency
  – Broad band
  – Augmented reality

• Augmented processes as result:
  – Decision making
  – Activities from value chain (particularly product development, operations and sale)
  – Services
Hyper competition

[Diagram showing various interconnected risks and outcomes, including:
- Man-made environmental disasters
- Food crises
- Natural disasters
- Extreme weather events
- Spread of infectious diseases
- Energy price shock
- Water crises
- Failure of climate-change mitigation and adaptation
- Large-scale involuntary migration
- Interstate conflict
- Weapons of mass destruction
- Failure of urban planning
- State collapse or crisis
- Failure of regional or global governance
- Terrorist attacks
- Profound social instability
- Failure of critical infrastructure
- Adverse consequences of technological advances
- Critical information infrastructure breakdown
- Cyberattacks
- Unemployment or underemployment
- Failure of financial mechanism or institution
- Illicit trade
- Fiscal crises
- Asset bubbles in a major economy
- Unmanageable inflation]

Legend:
- Economic Risks
- Geopolitical Risks
- Technological Risks
- Societal Risks

Number and strength of connections ("weighted degree")
Key considerations on Business Management

1. **Customer focus:**
   - To meet changing customer needs, businesses must:
     * Automatize value chain
     * Redesign value chain
     * Digitalize key activities from value chain
     * Connect key activities in business ecosystem

2. **Automation:**
   - To reshape the world of human work:
     * Cognitive technologies automated not only repetitive processes, but also some elements of human decision making

3. **Alliances:**
   - Collaboration for optimization global footprint and network

4. **Leaner cost structure:**
   - Business to be leaner, faster, and operate with lower cost
Technology is not always friend

• Value system and activities inside them are at the very center of storm of changes (digital disruptions):
  – Activities in value chain have 360 degree view of the strategy scope and focus
  – When digital disruption is norm, hyper-competition is unavoidable:

• Business leaders must go from evolving their business to reimagining it:
  – Supply chain is based on predictive maintenance
  – Product development, Operations, CRM, even Audit (particularly advisory audit) become strategic:
Product development

• The ability of Artificial Intelligence the form of Machine Learning to analyse big data:
  – Machine Learning automates the building of analytical models connecting demand forecast with construction and design
  – Augmented Reality demonstrated significant commercial and operational application too

• Scalability:
  – In next five years Machine Learning applications are poised to become commonplace
  – More than 500 million of smartphones have on board neural network Machine Learning capabilities
  – S&M will intensify their use of Machine Learning
# Real time audit

## Global audit delivery database platform (Magnia)
Magnia is an advanced auditing platform that houses the tools that support our methodology and allows us to deliver a comprehensive, focused, and streamlined audit. The tools include:

<table>
<thead>
<tr>
<th>Tool Description</th>
<th>How do we know our innovations are making a difference?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electronic documentation interrogation and analysis (Argus)</strong></td>
<td>Innovations in development; not yet in field</td>
</tr>
<tr>
<td>An artificial intelligence tool that quickly processes, highlights, and extracts key information from electronic documents. By significantly reducing the amount of time spent reviewing documents, Argus allows practitioners to focus on providing meaningful insights.</td>
<td>Broadly used across the practice</td>
</tr>
<tr>
<td><strong>Online collaboration, information-sharing, and progress-tracking (Deloitte Connect)</strong></td>
<td></td>
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<tr>
<td>Facilitates two-way dialogue between clients and their audit teams, assisting in managing work flow and enabling clients to assess and monitor engagements as they proceed.</td>
<td></td>
</tr>
<tr>
<td><strong>Automated analysis of public company filing disclosures (Disclosure Analytics/ Disclosure Net)</strong></td>
<td></td>
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<tr>
<td>Offers real-time, online access to public company filing disclosures, accounting policies, and comment letters, enabling instantaneous peer comparisons as well as updates on emerging disclosures and industry trends.</td>
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</tr>
<tr>
<td><strong>Mobile-enabled inventory counts (iCount)</strong></td>
<td></td>
</tr>
<tr>
<td>Enables professionals to use their phones onsite to record their physical inventory count observations and transmit the results in real-time to the audit team.</td>
<td></td>
</tr>
<tr>
<td><strong>iConfirm</strong></td>
<td></td>
</tr>
<tr>
<td>Coordinates the confirmation process on an online platform, offering a differentiated experience for our professionals and clients by automating and streamlining the confirmation process, including preparing, sending, receiving, and monitoring activities.</td>
<td></td>
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Paradigm Change in Economics and Business Management

Thinking Digital in Industry 4.0
Business strategy: M. Porter legacy

SUPPORT ACTIVITIES

Firm Infrastructure
Human Resource Management
Technology Development
Procurement

Inbound Logistics | Operations | Outbound Logistics | Marketing Sales | Service

PRIMARY ACTIVITIES

Potential Entrants
Bargaining power of suppliers
Threat of new entrants

Industry Competitors

Suppliers
Threat of substitute products or services

Substitutes
Bargaining power of buyers

Buyers
Exponential value chain

SUPPORT ACTIVITIES

- Firm Infrastructure
- Human Resource Management
- Technology Development
- Procurement

PRIMARY ACTIVITIES

- Inbound Logistics
- Operations
- Outbound Logistics
- Marketing Sales
- Service

Threat of New Entry

Supplier Power

Threat of Substitution

Buyer Power
Endless diversification

Suppliers
- Raw materials
- Capital goods

Distributors

Direct suppliers
- Components
- Labour
- Services

Competitors

Export distribution channels

Local distribution channels

Value and demand information
Cost and supply information

Market A
Market B
Market C
End Consumers
Inside IR 4.0
PDP loop

• Physical-Digital-Physical (PDP) loop is hallmark of Industry 4.0
  – It enables real-time access to data throughout the value chain, giving actionable information for making game changing decisions
  – For example in PLC, developers create “digital twin” of physical product and then use real time data to optimize product design across number of parameters before sending new product into production

• Truly digital enterprise takes PDP loop across all aspects of business:
  – Supply
  – Maintenance
  – Human resource
  – Finance
  – R&I
  – Audit

• PDP loop has given rise to move from toward exponential (or digital) value chains
Strategy pattern in Industry 4.0

**Strategy Analysis**
- Early entry to lead markets
- Early settings of global objective
- Recognize an industry shift

**Strategy Implementation**
- Sales
- Develop leading products based on internal R&D and open innovation
- Global market niches
- Introduce amalgams of innovations from cyber/physical or biological worlds
- Meta-national advantage
- Build selective functional assets
- Develop global corporate governance
Are you ready?

• **Industry 4.0 is trigger of change:**
  – Activities in value chain are the place where the IR 4.0 is happening

• **Adjustments in Macroeconomics:**
  – It is the time for visible hand of the state to augment orthodox approach based on invisible hand of the market

• **Adjustments in Business Management:**
  – Innovative ecosystems promoting exponential value chains

• **Business strategy is everyone and everyday job in business ecosystem with the aim to support sustainable and inclusive growth**
Thank you!

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