PPIC TRANSFORMATION FOR SUSTAINABLE INDUSTRY IN VUCA ENVIRONMENT

Keynote Speech
National Seminar on Production Planning and Inventory Control (PPIC) 2022

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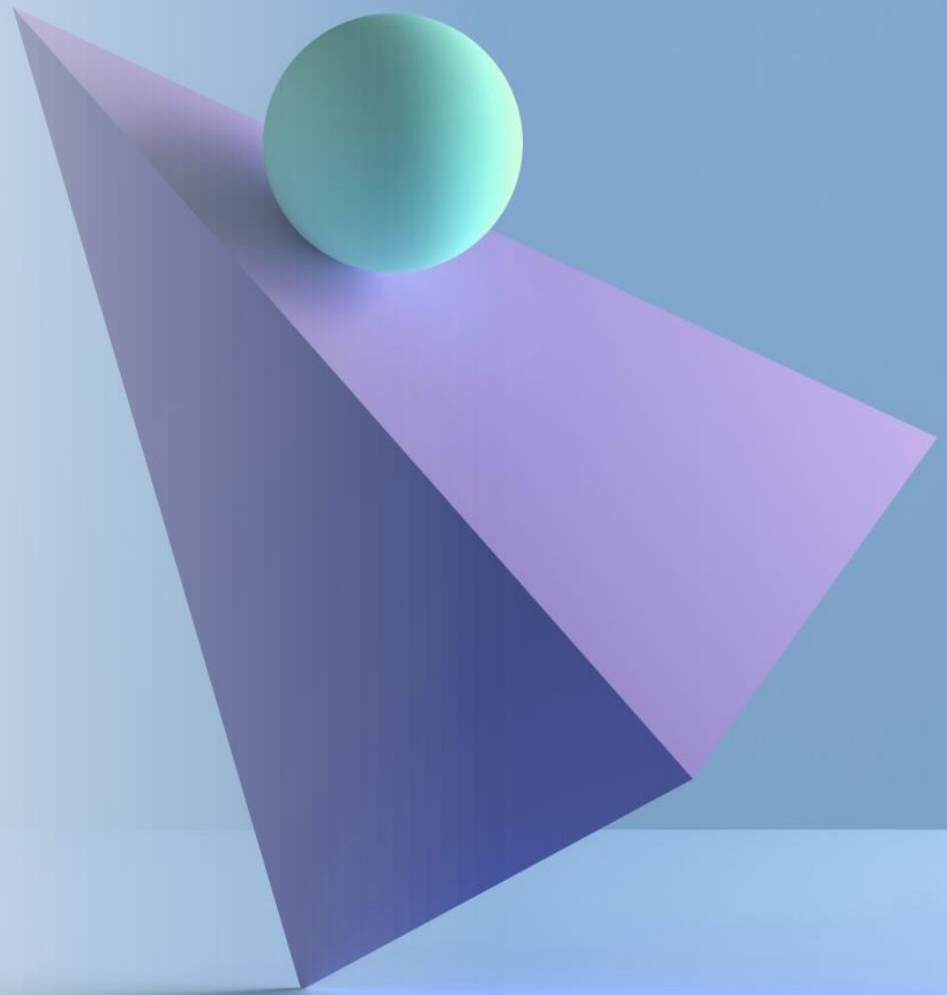

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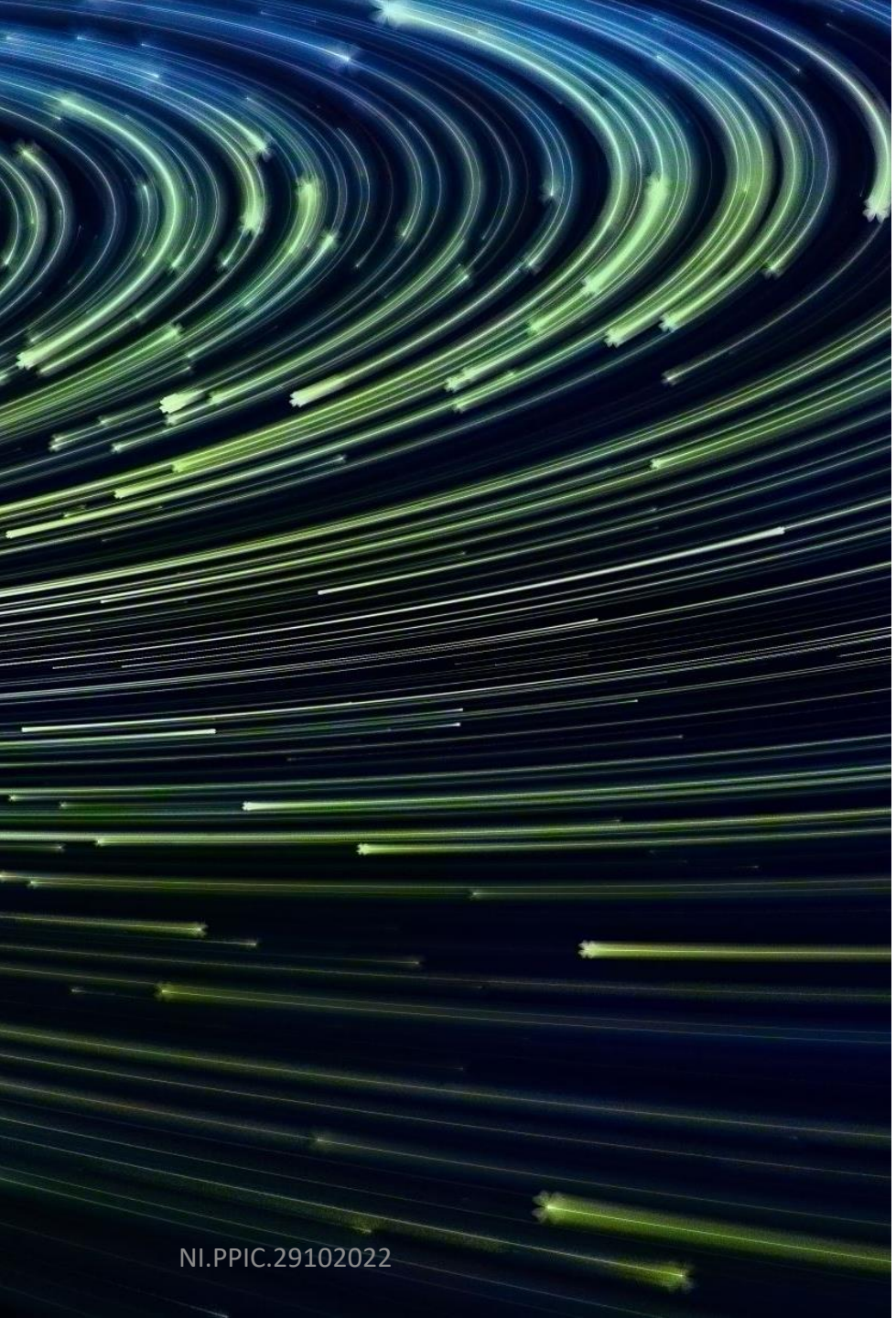
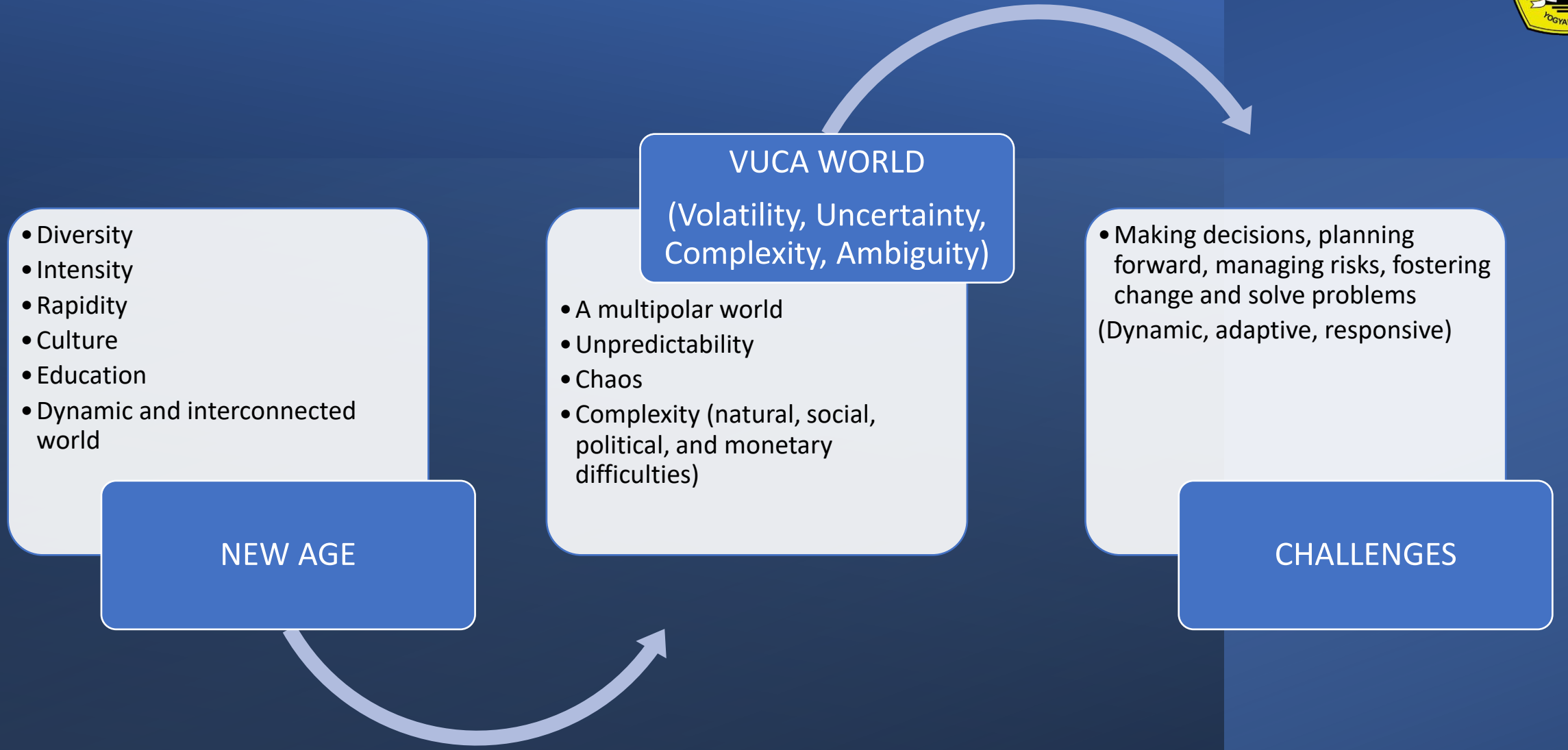


Current Industry Challenges

- VUCA
- Sustainability
- Internet of Things (IoT)


NEW AGE
• Diversity
• Intensity
• Rapidity
• Culture
• Education
• Dynamic and interconnected world
VUCA WORLD
(Volatility, Uncertainty, Complexity, Ambiguity)
• A multipolar world
• Unpredictability
• Chaos
• Complexity (natural, social, political, and monetary difficulties)
CHALLENGES
• Making decisions, planning forward, managing risks, fostering change and solve problems
(Dynamic, adaptive, responsive)

VUCA

- The VUCA concept was first introduced in 1987 by the U.S. military after the end of the Cold War to describe the conditions of a world ever more difficult to predict and rely on, shaped by Volatility, Uncertainty, Complexity, and Ambiguity.
- The word gained immense usage in 2002.
- The First appearance in the 1990s, the concept was quickly embraced by other fields, such as strategic decision-making, risk management, and situational problem-solving.
- Business and management science adopted the VUCA concept after the financial crisis in 2008–2009 when societies, companies, and organizations all over the world suddenly found themselves faced with similar conditions in their social and economic environments and models.
- Current research on the VUCA concept focuses on its consequences for leadership and strategic development and the challenges to adapting the mindsets of managers and decision-makers to these new conditions.

VUCA

VOLATILITY

- The rate of change (usually rapid) and the pattern of dynamics observed in socio-environmental systems.
- Strong fluctuations in macroeconomic conditions, financial markets, commodity prices, and extreme environmental pressures affecting nation-states.
- Refers to turbulence, or the unexpected, which has increased over the last thirty years with corresponding increases in both the intensity and length of the events.

UNCERTAINTY

- Characterized by the lack of predictability and the likely prospects for a surprise.
- The result of the multiple feedback loops and interactions that are inherent to complex systems.

VUCA

COMPLEXITY

- The intricate and extensive network structure and dynamic pathways existing between the components of a system.
- A state of a system built on principles of chaos and subject to tipping points.

AMBIGUITY

- The haziness of reality, the potential for misreads, the mixed meanings of conditions, and the mixed outcomes of actions.
- A lack of clarity surrounds an event and its meaning or the causes behind the things happening which are unclear and difficult to understand.
- The inability to accurately identify threats and opportunities.

Volatility

Characteristics

- Relatively unstable change. The challenge is unexpected and may be of unknown duration, but it is not necessarily hard to understand; knowledge about it is often available.

Business example

- Prices fluctuate after a natural disaster, such as when a fire takes out a supplier.

Business approach

- Conduct risk analysis, build in spare capacity and devote resources to preparedness – for instance, stockpile inventory or overbuy talent.
- These steps are typically costly and therefore management should only commit where the cost is justified by the downside.

Communication role

- *Prepare a crisis management strategy. The communication function should be integrally involved.*

Uncertainty

Characteristics

- Lack of knowledge. Nevertheless, the situation's basic cause and effect are known.

Business example

- A competitor's expected product launch can change the future of the business and the market.

Business approach

- Increase business intelligence activities. Collect, interpret, and share relevant information. Engage in serious boundary-spanning collaboration.

Communication role

- *The organization's communication function is the logical area in which to build these resources, especially as the role incorporates boundary-spanning.*

Complexity

Characteristics

- Managers can't know what they don't know, which compounds the complexity of the situation.
- Managers may know the likely outcomes but not the unintended consequences of complexity factors.
- Some information is available or can be predicted, but the volume or nature of it can be overwhelming.

Business example

- The company operates in many countries, each of which has its own regulatory environment, tariffs and cultural values.

Business approach

- Restructure, bring in or develop specialists, and increase resources adequate to address the complexity.

Communication role

- *Identify the key stakeholders in each country and initiate a systematic stakeholder relations management program. Tailor messages for each country and its unique culture. Government relations is crucial.*

Ambiguity

Characteristics

- Causal relationships are completely unclear. No precedents exist; management faces “unknown unknowns.”

Business example

- The company decides to move into developing markets or to launch new types of products that are outside its previous experience.

Business approach

- Companies need to be prepared to take on risk, perhaps initially in trial markets, to evaluate outcomes. Lessons learnt can be applied progressively over time to other markets.

Communication role

- *Communicators can support with gathering intelligence about the operating environment including regulatory parameters, and in preparing broad issue management and crisis communication strategies in advance.*

COSTS OF UNCERTAINTY

Range from $US221 million to $US1.87 billion.

- US absenteeism — $US225.8 billion annually (Centre for Disease Control and Prevention).
- US presenteeism — 57.5 days a year per employee of nonproductive work (Virgin Pulse).
- Australian presenteeism — $AUD34 billion a year (Centre for International Economics).

SUSTAINABLE AND MORE EFFICIENT INDUSTRY

- Circular Economy (CE)
- Internet of Things (IoT)

Circular Economy

DEFINITION

- An economic system that replaces the “end-of-life” concept with reduce, reuse, recycle, and recover materials from the production/distribution and consumption processes. It replaces the consumers with users and the products with product-service systems.
- Emphasizes the philosophy of manufacturing, usage, and recycling of products promoting better consumption and product recovery at the micro, meso, and macro levels to achieve sustainable development for future generations.
- Follows a cyclic or closed-loop material flow which emphasizes on no-waste principle leading to better consumption of material; energy; adequate utilization of scarce resources.

OBJECTIVE

- To achieve “zero-waste,” modular designs, design for the upgrade, disassembly, repair, remanufacture, and closing the loop on materials while reducing the usage of energy and materials.

Sustainable Supply Chain Management (SSCM)

- SSCM is “the management of material, information, and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account, which are derived from customer and stakeholder requirements” (Seuring and Müller, 2008)

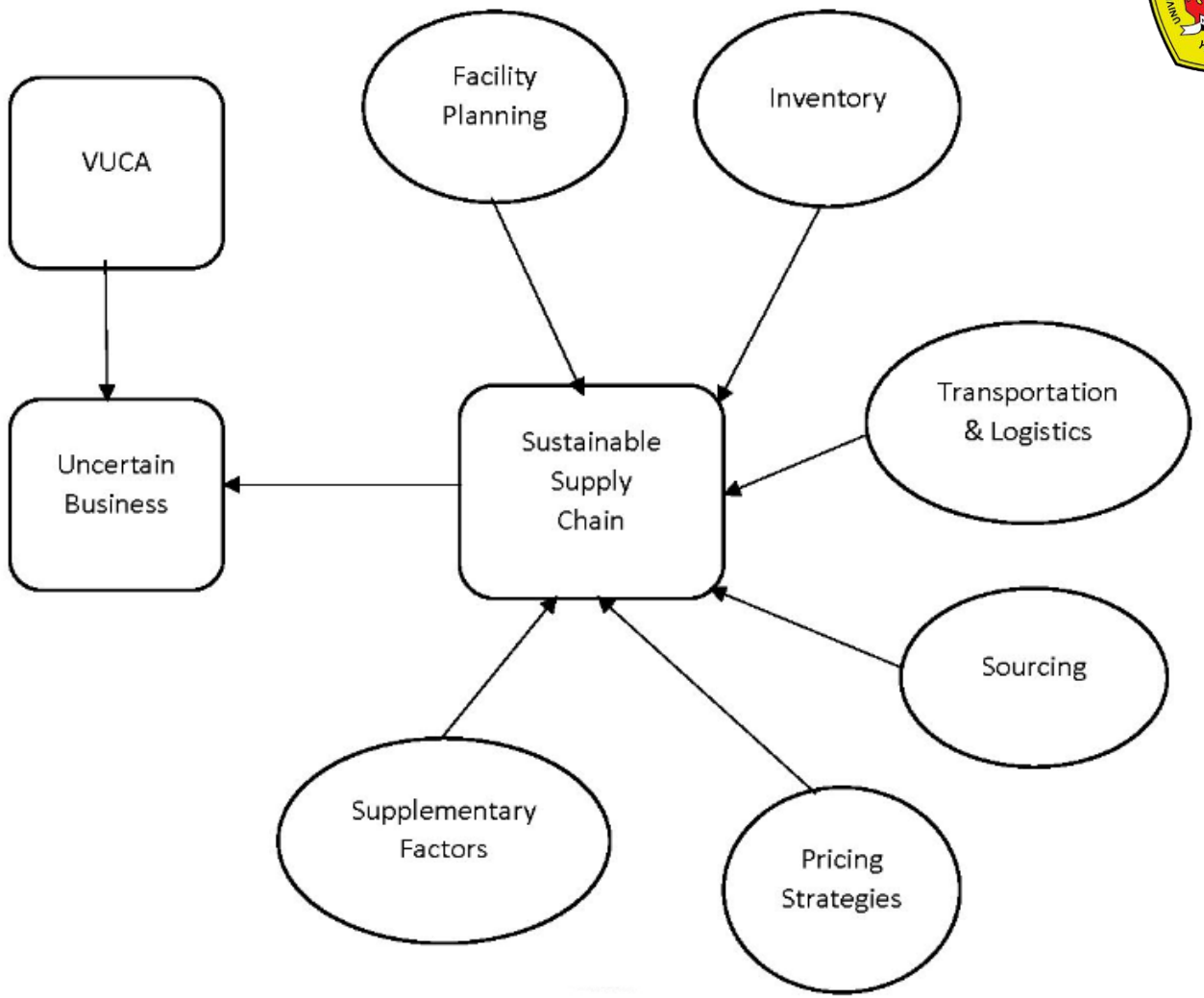


Figure 1. Sustainable Supply Chain Framework

(Chopra and Meindl’s, 2007)

Internet of Things (IoT)

Initially created for devices to communicate with one another through the internet

Termed as ‘smart systems

Three layers

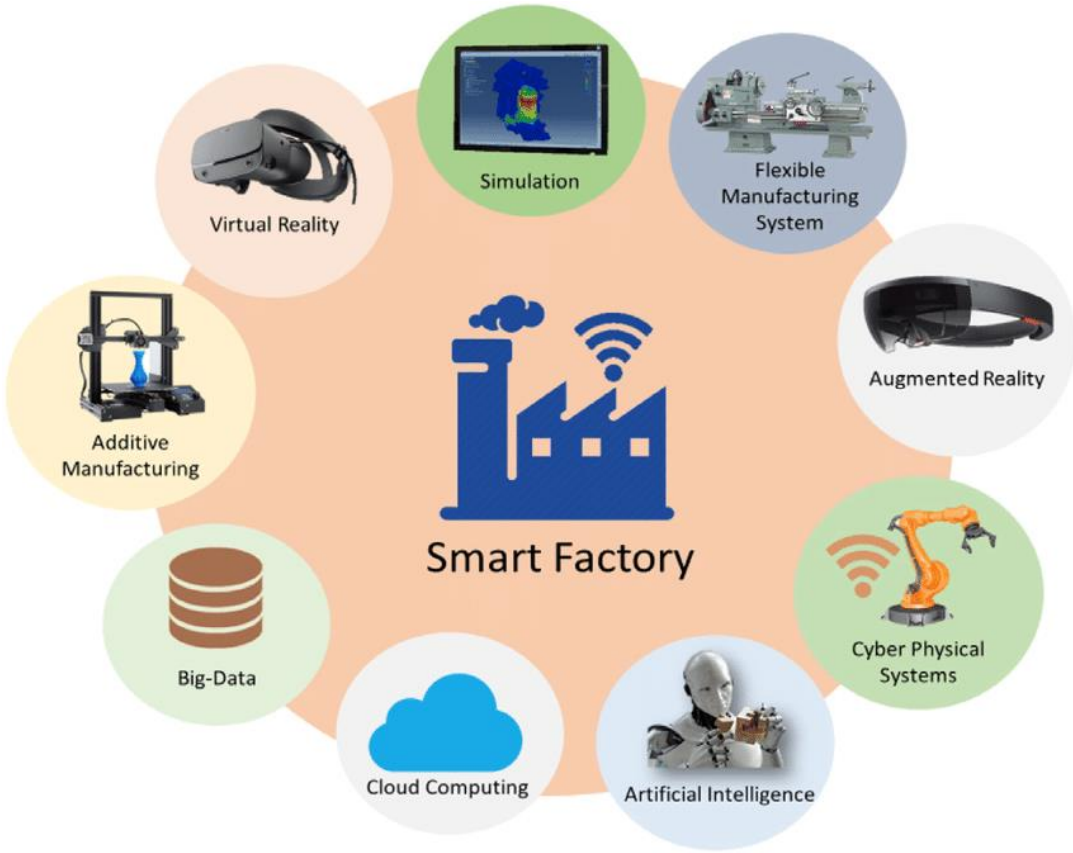
Personal layer - transfer information over the internet and other wireless network and collect/retrieve information from different interconnected devices (RFID, sensors, and wireless devices).

Network-based layer - data transmission from the personal to the network layer takes place through the connectivity between the devices, which is influenced by the device compatibility.

Application-focused layer - connect each other.

SMART MANUFACTURING SYSTEM

- Built upon the concepts of Industry 4.0 that play increasingly important roles in improving resource efficiency, product life cycles, and closing the loop on end-of-life products.
- Include cyber-physical systems, smart production controls, big data analytics, and smart energy.
- Improve environmental performance by better controlling manufacturing processes that ensure improved production of top-quality products while reducing risks to workers, consumers, and the environment.



Industrial Impact of Digital Transformation

Digital transformation involves the following four stages: digitalization, virtualization, connectedness, and autonomization.

Digitized and virtualized systems of systems lead to new scenarios of industrial work, i.e., cooperation between humans and machines within a smart factory.

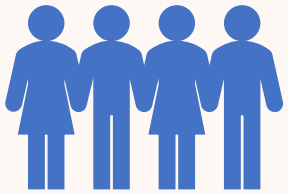
Workers are calling for individualization to their needs and are at the same time faced with life-long learning and the adaption to new competence profiles.

Organization is challenged by the flexibilization of traditional structures, new business models, and more direct ways of communication.

Organizational Capacity Established by VUCA

1. Anticipate the issues that shape conditions
2. Understand the consequences of issues and actions
3. Appreciate the interdependence of variables
4. Prepare for alternative realities and challenges
5. Interpret and address relevant opportunities

Culture and Organizational Learning in VUCA Environment



CULTURE

Technology changes

Soft-skilled approach

Human Orientation

Cross-cultural sensitivity

LEADERSHIP

Empathy/Collaboration

Adaptability/Agility

Self-Awareness

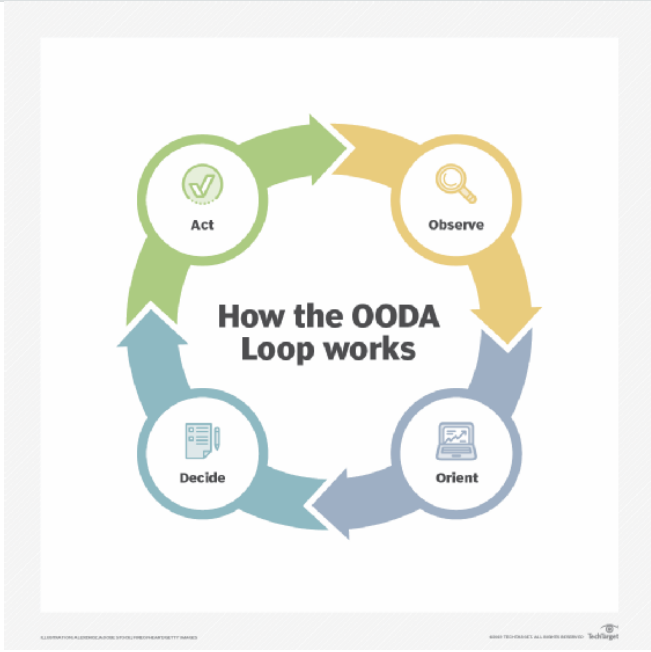
Visionary

An Aptitude for Critical Thinking

Confidence

6 Personal Qualities in a VUCA World

- A balanced approach to risk
- Open to experimentation and comfortable with uncertainty
- Psychological and physical self-awareness
- Comfortable with – and not prejudiced towards – change
- Curiosity, with the ability to learn fast
- Solution-oriented with ruthless prioritization

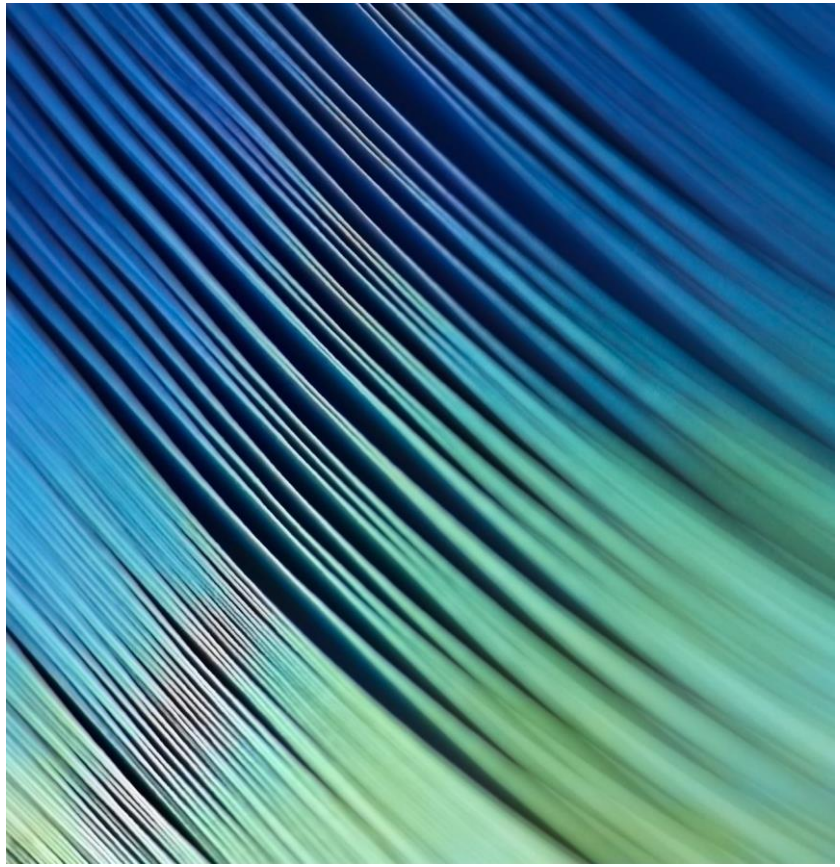


Counter Volatility with Vision

- Accept and embrace change as a constant, unpredictable feature of your working environment. Don't resist it.
- Create a strong and compelling statement of team objectives and values, and develop a clear, shared vision of the future.
- Make sure you set your team members flexible goals that you can amend when necessary.

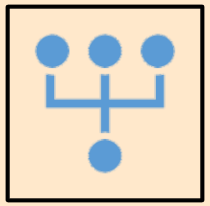
Meet Uncertainty with Understanding

Pause to listen and look around.
Make investing in, analysing, and interpreting business and competitive intelligence a priority.
Stay updated with industry news and listen carefully to your customers.
Review and evaluate your performance.
Simulate and experiment with situations to explore how customers might play out, and how you might react to them in the future.
Gaming, scenario planning, crisis planning, and role-playing for generating foresight and preparing responses.



React to Complexity with Clarity

Communicate clearly with your people to understand your team's or organization's direction.



Develop teams and promote collaboration to work effectively in a fast-paced and unpredictable environment.

Fight Ambiguity with Agility

- Promote flexibility, adaptability, and agility.
- Plan ahead, but build in contingency time and be prepared to alter your plans as events unfold.
- Hire, develop and promote collaboration; comfortable with ambiguity and change and have complex thinking skills.
- Encourage people to think and work outside their usual functional areas to increase their knowledge and experience (Job rotation and cross-training).
- Lead your team members but don't dictate to or control them.
- Develop a collaborative environment, and work hard to build consensus. Encourage debate, dissent, and participation from everyone.
- Embrace an "ideas culture" and "Vibrant, unreal, crazy, and astounding (an energetic culture that can give teams and organizations a creative, agile edge in uncertain times).
- Reward team members who demonstrate vision, understanding, clarity, and agility.

KEY STRATEGIES FOR BUSINESS

- Business agility
- Strategic workforce and demand planning
- System thinking organization and shared leadership
- Multistakeholder-approach management
- Purpose-driven leadership
- Conscientious and value-based leadership
- Talent management sustainability
- Recovery management for organizational resilience
- New leadership mindset and competence
- Change orientation and readiness Lean management
- Lean Management

PPIC in the VUCA Environment (1)

NO	TRADITIONAL PPIC	PPIC IN THE VUCA ERA
1	Maintain high levels of buffer inventory	High risk inventory • Cost of capacity buffer vs. lost sales • Capacity buffer while maintaining reliable relationships with subcontractors
2	Long life cycle	Increase the pace of the flow of information across the supply chain to reduce supply chain cycle time
3	Make-to-Stock production	Assemble-to-Order production • Postponement strategy to enable companies to reduce inventory while improving customer service dramatically
4	Predictable demand	Volatile demands - continuously changing demands • Collaborative between the supply chain players and, most importantly, with the suppliers and customers • Information sharing among supply chain partners

PPIC in the VUCA Environment (2)

NO	TRADITIONAL PPIC	PPIC IN THE VUCA ERA
5	Predictable supply chain	Uncertain supply chain • Quality control, new product design, and supply chain redesign • Improve the performance of the value-added process through lead time reduction • Coordinate work closely with the suppliers • postponement, volume/delivery flexibility, process flexibility, customer flexibility, multiple suppliers, strategic stocks, collaboration, Information and Communication Technology (ICT) system, lead time management, financial risk management, and quantitative techniques
6	Common management	Complex adaptive systems (diversity, interdependency, variability, variety) • Complexity: detail complexity and dynamic complexity
7	Known possible outcomes	Ambiguity management -unknown possible outcomes (lack of knowledge of the decision makers, not the lack of information) • Sharing accurate and correct interpretations across processes

VUCA in Academic Lens

Academic Volatility (AV)

- The ecosystem on the engineering institute campus is becoming more diverse.
- Students react and respond differently to the imbalance between the academic institution and real-life situations.

Academic Uncertainty (AU)

- The academic change is so fast-paced that uncertainty looms over it.

Academic Complexity (AC)

- Technically, technologically, and socially, a whole network of complexity has set in with the academics relying on space, biotechnology, emotional intelligence, resilience, leadership, and people management.

Academic Ambiguity (AA)

- How does academia balance a wide spectrum of students, curricula, novelty, and educational practices?
- Digital access and transformation behove to pause and understand the environment.
- To be aware, alert, and like a scout, be prepared and armored with practical tips and various solutions.
- Students learn patterns, design thinking, multiple solutions to a single problem, hierarchical dissemination, and divergent approaches.

ENGINEERING EDUCATION

Engineering is derived from Latin, means "cleverness," and Engineers (from *ingeniare*) are meant to contrive and devise.

Engineers are the backbone of the country's economy and are the core of the overall development of people's quality of life.

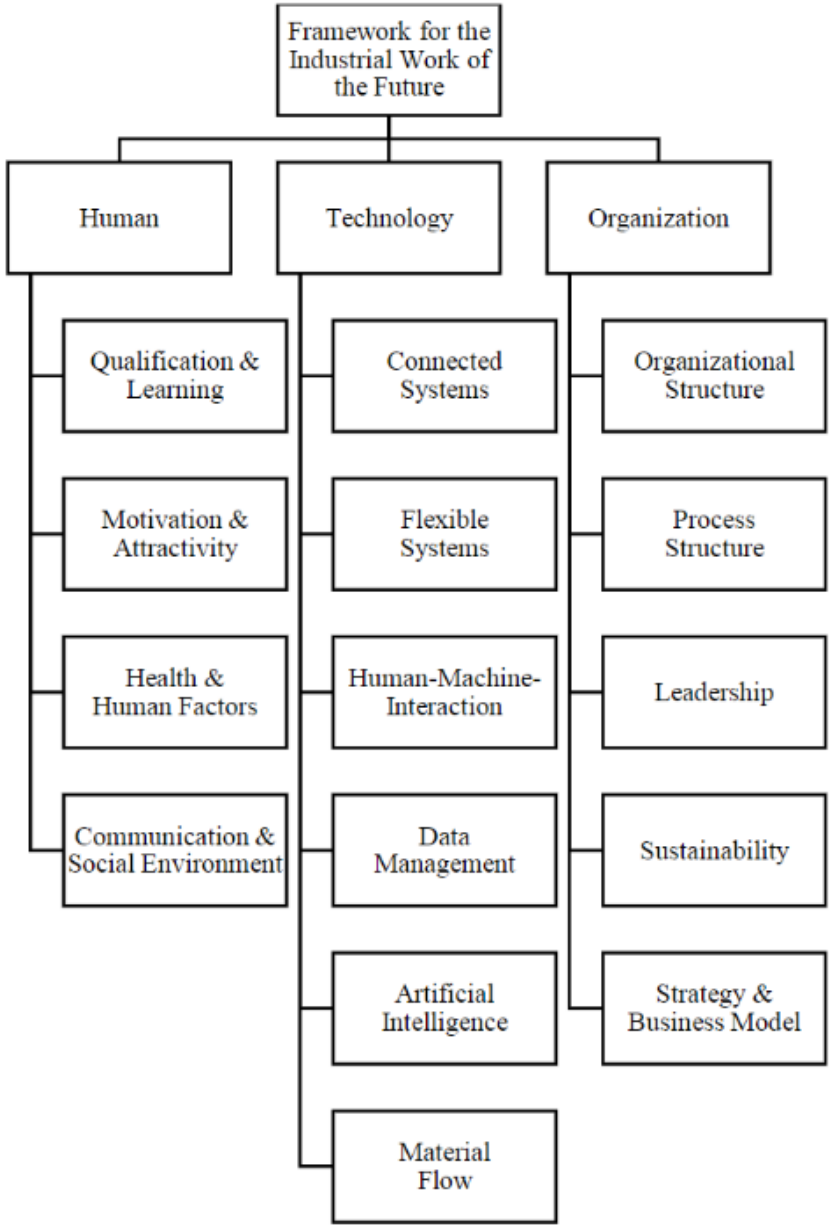
Engineering institutions and engineering educators are responsible for producing competent and skilled engineers to cope with the changing requirements of the industry.

7 Missing Basics of Engineering (David E.Goldberg)

The ability to:

- Question
- Label patterns
- Model conceptually
- Decompose
- Experiment
- Visualize or ideate
- Communicate effectively

Framework for the industrial work of the future – first level element (Schumacher, 2020)



Engineering Institutions Strategies (1)

ENHANCING THE TEACHING–LEARNING PROCESS

Adopting innovative teaching-learning process

Emphasis on outcome based education

Partnerships between industry and institutions, institutions-institutions, institutions – professional bodies

Creation of research culture

Exposure to current industrial practice

Provision to foster innovation and creativity etc

UP-SKILLING THE FACULTY MEMBERS

Technical Education & Curriculum Aspects

Professional Values, Ethics, Ecology & Sustainable Development

Communication Skills, Modes and Knowledge Dissemination

Instructional Planning and Delivery

Technology Enabled Learning and Life-long Self-learning

Effective Modes of Student Assessment and Evaluation

Engineering Institutions Strategies (2)

ENHANCING STUDENTS' ATTITUDE AND PARTICIPATION

Professional ethics education

Integration of human and moral values to boost the attitude of the students

Emphasis on project based learning, internships, collaborative learning

Introduction of specialist courses

Awareness on changing job markets etc.

UPGRADING THE CURRICULUM AND FACILITIES

General skills development

Research and project-based learning

Innovation and creativity etc. Education on 21st-century skills

Syllabus and curriculum periodically to suit the global scenario

Development of infrastructure

Qualified faculty members etc.

Faculty Development Program Orientation

- Organise and direct learning situations
- Assess and evaluate the teaching-learning process (from pedagogy to andragogy)
- Conceive, design, implement and operate on futuristic skills
- Involve students as partners and owners of their learning
- Teamwork
- Adapt digital transformation
- Conform to the values, mission, and vision of the organization.
- Be a transformational leader

CONCLUSION

VUCA, sustainability, and IoT are new norms in business, and organizations must make strategies to tackle such issues.

VUCA can be used as a method for altering the traditional PPIC.

Vision, understanding, clarity, and agility are approaches that can be used by organization leaders to deal with VUCA.

Postponement, flexibility, collaboration, ICT, and risk management are dynamic, adaptive, responsive strategies to overcome VUCA in an industrial environment.

Enhancing the teaching-learning process, up-skilling the faculty members, enhancing students' attitude and participation, and upgrading the curriculum and facilities are strategies that can be applied in engineering institutions in the VUCA environment.

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