

SUPPLY CHAIN DYNAMICS, AGILITY AND RELATIONSHIP MANAGEMENT: BSS 421



**WEEK :AGILE PRODUCTION
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RECAP OF LAST WEEK'S TOPIC



We discussed;

1. Outsourcing process and supply chain dynamics
2. Subcontracting process and supply chain dynamics
3. Business process management and supply chain dynamics

Task for Last Week



1. Why is outsourcing not as prominent as it was in the 90s

Businesses have pressure to retain employees, learning is easy, introducing new lines of business, can control costs etc.

2. Why are there many challenges in subcontracting?

Jobs subcontracted are small and therefore they are given to smaller suppliers. These suppliers have a lot of challenges.

3. Which industry would you like to understand its BPM?

Objectives of week's Topic



1. To describe nature of agility
2. To describe the impact of agility in supply chains and businesses
3. To describe the current state of manufacturing and businesses

Introduction to Agility production



1. The term agility was coined at IOCCOCA conference at Lehigh University, USA in 1991. The conference involved executives from manufacturing industries and researchers who had convened to find ways of surviving in the competitive environment. Iacocca Institute, (1991). 21st Century manufacturing enterprise strategy: An industry-led view. Bethlehem, PA: Iacocca Institute at Lehigh University.
2. The term agility was coined and defined as the ability of a manufacturing system to meet the rapidly changing needs of the market place (Dove, 1992). Dove, R. (1992). The 21st manufacturing enterprise strategy or what is this talk about agility? Retrieved from <https://academia.edu/22216159>.

Introduction to Agility production Cont'd



3. The forum observed that such an organization needed to have systems capable of shifting quickly among product models and product lines in order to take advantage of the opportunities and minimize the impact of threat from competitors and emerging technologies.

Dimensions of Agility



1. Gligor et, al. (2013) p242; Agility is alertness, accessibility, decisiveness, swiftness and flexibility.
2. Sambamurthy, et al. (2003) p238; Identified customer agility, partnership agility and operational agility in relation to supply chain performance.
3. Worley & Lawler III (2010) p195 : in addition to systems agility, mind-set agility, adaptable organizational design and leadership are a necessity for an agile organization.

Dimensions of Agility Cont'd



4. Charbonier-Voirin (2011)p 120: Agility is organizational propensity to read the markets, utilize resources, improvise and innovate transformational processes, mobilize and align human resources to the strategic prospects.

5. Ideas concerning agility found their way into literature in 1950s (Wendler, 2013, p1165) but the concept gained more prominence after the Iacocca conference of 1991.

Dimensions of Agility : References



1. Charbonier-Voirin, A. (2011). The development and partial testing of psychometric and properties of a measurement scale of organizational agility. *M@n@gement*, 14(2), 119-156.
2. Gligor, D.M., Mary, C., Holcomb & Theodore P. S. (2013). A multidisplinary approach to supply chain agility: Conceptualization and scale development. *Journal of Business Logistics*, 34 (2), 241-245.
3. Gunasekaran, R.E. (1998). Agile manufacturing enablers and an implementation framework. *International Journal of Production Research*, 36 (5), 123-124.
4. Iacocca Institute, (1991). 21st Century manufacturing enterprise strategy: An industry-led view. Bethlehem, PA: Iacocca Institute at Lehigh University.
5. Sambamurthy, V., Baradwaj, A. & Grover V. (2003). Shaping agility through digital options: Reconceptualising the role of information technology in contemporary firms. *MIS Quarterly*, 27 (2), 237-263.
6. Wendler, R. (2013). *Structure of agility from different perspectives*. Proceedings of 2013 Federated Conference on Computer Science and Information Systems, 1(1), 1165-1172 .
7. Worley, C. G., & Lawler III, E. E. (2010). Agility and organization design, a diagnostic Framework. *Organizational Dynamics*, 39 (2), 194-204.

Models of Agility : Dove 1992 Model



21st Manufacturing enterprise strategy. He identified four drivers of agility

1. **Continuous change**; Technological advancement led to faster cycles of obsolescence of product, rapid innovation and shrinking cycle times.

2. **Rapid response**: Ability to respond quickly to the threat from the competitors by focusing on reducing product cycle times moving, customer desires and product ideas into quick product and service delivery.

3. **Evolving definition of quality**. Japanese perfected the art of providing the customers with what they want by having a modular base which they quickly configure to provide the product that the customer desires.

4. **Environmental responsibility**. Organizations to adopt safer products and production process.

Models of Agility : Dove 1992 Model



21st Manufacturing enterprise strategy.

To respond to drivers, Dove suggested the following capabilities.

1. **Agile enterprise** that is positioned to deal with any change from the business environment.
2. **Factory American Net (FAN)**; Good infrastructural network of information science where the manufacturers are well connected to stake holders such as the suppliers, buyers, designers, developers etc.
3. **Human assets**. Highly skilled and competent employees who are able to cope with the demands of the customers.
4. **Plug compatible companies**. Partnering with the institutions to either produce the goods or supply them to the customers.
5. **Virtual cooperation**. This is a temporary entity that is created when there is a business opportunity and dissolved when it is no longer useful.

Models of Agility : Gunasekaran (1998) Enablers and implementation of Agility Model



Gunasekaran (1998) Enablers and implementation of Agility Framework.

According to him the enablers of agile manufacturing are;

- 1.Virtual enterprise configuration to enable quick response.
- 2.Physically distributed teams and manufacturing facilities.
- 3.Rapid partnership formation tools and metrics.
- 4.Concurrent engineering.
- 5.Integrated product, production and business information systems.
- 6.Rapid prototyping tools.
- 7.Electronic commerce.

Gunasekaran, R.E. (1998). Agile manufacturing enablers and an implementation framework.

International Journal of Production Research, 36 (5), 123-124.

Models of Agility : Sharifi and Zhang (1999) Attributes and Capabilities Frame work.



They identified attributes of agile production as;

1.Responsiveness- this is sensing perceiving and anticipation of change and providing immediate response.

2.Competency. Refers to strategic vision, appropriate technology, product service quality, effectiveness, introduction of new products etc.

the employees.

Models of Agility : Sharifi and Zhang (1999) Attributes and Capabilities Frame work. Cont'd



3.Flexibility- Product volume flexibility, product model configuration, organization and people flexibility.

4.Quickness. – Introducing new products to market quickly and quick delivery when an order is been placed by the customer.

Sharifi and Zhang emphasized on conceptual levels where decisions should be made after careful analysis in regard to integration, competence, team building capability, technology, quality, change, partnerships, market, education and welfare of the employees.

Models of Agility : Sharifi and Zhang (1999) Attributes and Capabilities Frame work Cont'd



Drivers (causes) of Agility

- 1.The ever-changing demands of the customers. They are aware of better goods globally.
- 2.Ever changing market dynamics and the easy access of the markets worldwide
- 3.Competition. Businesses are developing innovations where products developed render the existing ones obsolete within a very short time.
- 4.Social cultural changes. People are exposed to others cultures and they have in most cases adopted it.
- 5.Technology. Technology has revolutionized the way things have always been done.

Models of Agility : Sharifi and Zhang (1999) Attributes and Capabilities Frame work Cont'd



Enablers (responses) of agility

1. Good infrastructural capabilities such as the buildings, equipment capital and any other facility that is required for transformation of the inputs to the output.
2. The latest technology that is required to power the transformation of the inputs to outputs.
3. A good internal and external connectivity with the related supply chains.
4. Multiskilled, empowered and competent employees.

Sharifi, H., & Zhang, Z. (1999). A methodology for achieving agility in manufacturing Organizations: An introduction. *International Journal of Production Economics*, 62(1-2), 7-22.

Nature of Agile Production



- Agility is a rapid change in the business environment and the ability of organizations to adopt through flexibility and adaptation to change.
- It is an orientation that embodies both the concepts of lean and flexibility.
- Lean is producing quality goods at low cost by eliminating wastes or processes that do not add value.

Nature of Agile Production



- Flexibility is the ability to configure and reconfigure the processes in order to respond to an external change.
- Agility requirements studying market dynamics, having a flexible system and basic module that can be configured to the requirement of the customer. This is referred to as late **customization**.

Hu, J.S (2013)

Evolving Paradigms of Manufacturing: From Mass Production to Mass Customization and Personalization. Sxth CIRP Conference on Manufacturing Systems 2013

Forty SiP

procedia CIRP 7 (2013) 3 – 8

Doi: 10.1016/j.procir.2013.05.002

Product Customization and Product Personalization



Hu (2013) provides explanation as to why product customization and product personalization emerged,

1. Craft production produced products that were costly. It had no manufacturing system. It was also localized.
2. Mass production was facilitated by automated moving assembly, interchangeability, scientific management, and technology to mass produce goods without variety .
3. Mass customization came into existence in the 80s enable by-;

Product Customization and Product Personalization Cont'd



1. Product family Architecture . This facilitates product family strategy where functional modules can be shared and variants where combinations can be generated to suite customer desire.
2. Reconfiguration manufacturing system was caused by need to meet customer changing needs . It has adjustable capacity.
3. Delayed differentiation. This is possession of common assemblies up to a point of differentiation . It reduces costs and improves responsiveness. The combinations did not mee t personal needs and increased manufacturing complexity.

Product Customization and Product Personalization Cont'd



4. **Personalization** . Creating of goods that meets personal needs facilitated by internet, computing capability and responsive manufacturing such as 3D printing and open architecture enable customers to take part co-design of products.

5. **Open architecture products**. It has shared modules , customized modules that allow to choose products , mix and match as well as personalized modules that allow co-creation and design of products between customers and the producer.

Product Customization and Product Personalization Cont'd



6. **On -demand manufacturing systems.** This is a cost efficient additive manufacturing that creates solid 3D objects directly from computer Aided designs without physical prototype. Can be configured and reconfigured with customer demands.

7. **Cyber physical systems.** A combination of computation and physical systems to produce what customer desires,

Customization, Product Personalization and agile Production.



Agility strikes a balance between lean and mass manufacturing in that inventory is not at its lowest and it is not as high as in traditional manufacturing. Stock in agility is-

- 1.Held frequently as work in progress that requires customization rather than finished goods.
- 2.Stock should be deliberately held but not build without the organization having control.
- 3.Should be held close to the stage of finished items so that quick assembling or reassembling is possible.

Customization, Product Personalization and agile Production.



4. Stock is pulled based on the customer demand.
5. Buyer and supplier plan for stock together so that when there is an order everyone is in a position to react as fast as possible.

Agility manufacturing requires close relationship with high level of trust and integration of processes and systems across organization so that when there is an order everyone is positioned to react but keeping the inventory low.

Agility in 2020s Manufacturing/ Business



Powell et. Al,(2022) pp2-6 explains current manufacturing paradigm driven by agility as;

- New and renewed manufacturing paradigm that address circular manufacturing to meet triple bottom line namely;
 1. Minimal environmental impact.
 2. Conserving energy and natural resources.
 3. Enhance employee, community welfare and make safe products

Agility in 2020s Manufacturing



- **Technology based manufacturing paradigm.** It aims at supporting sustainable production through digital technologies and Smart manufacturing.
 - Digital technologies powering manufacturing which supports
 1. manufacturing tasks
 2. Decision making based on digital models
 3. Simulations in virtual environment without use of physical prototypes and experiments.

Agility in 2020s Manufacturing / Business



- **Smart manufacturing;** Involves development of cyber – physical production system consisting of human resources and production equipment that continuously respond to stochastic and forecasted changes in the system and environment to optimize themselves according to manufacturing demands.

Note. What is

- Stochastic event?
- Forecasted event?

Agility and Supply Chain Dynamics



Technology based manufacturing should provide ;

1. **Economic gains** such as cost saving through accurate and smart planning , control , scheduling , programming and short lead times
2. **Environmental gains** : Increase material, energy and water efficiency through real time monitoring of wastage.
3. **Social gains**: Enabled smart wearable and collaborative technologies that increase productivity, safety, health and welfare of employees.

1. Powell, D.J.; Romero, D.;Gaiardelli, P. New and Renewed Manufacturing Paradigms for Sustainable Production. Sustainability 2022, 14, 1279. <https://doi.org/10.3390/su14031279>

2. Alayón, C., Säfsten, K., Johansson, G. (2017) Conceptual sustainable production principles in practice: Do they reflect what companies do?. Journal of Cleaner Production, 141: 693-701 <https://doi.org/10.1016/j.jclepro.2016.09.079>

Agility and Supply Chain Dynamics in 2020s



1. Green sourcing and Supplier selection: Choosing suppliers who follow green standards and run environmentally-friendly businesses.
2. Green product and process design: The green product and process design
3. Green transportation and reverse logistics: Organizations should analyze their network to find ways of consolidating shipments to maximize efficiency and reduce wastage.

Supply Chain Dynamics in 2020s



- Organizations therefore require educated , skilled and competent employees to visualize innovations in green procurement.
- Significant amount of money is required to implement agile supply chains.
- Strategy is key to achieving agile supply chains.

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*THANK YOU ALL
PREPARE FOR A
CONTINUOUS ASSESSMENT
NEXT WEEK(7)*