

Knowledge Management and Project-Based Knowledge Creation¹

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Abstract

Important resources of the Industry 4.0 economy are innovation, knowledge and information. Modern innovation is profoundly supported by enabling technologies. Moreover, knowledge- and process-based networked organizations, combined with portfolio-, programme- and project management evolved as important strategic key success factors. Major sources of knowledge creation for purposes of knowledge management are Innovative Continuous Improvement Projects resulting from Systems Thinking initiatives emanating from a formal Quality Management System; Research and Innovation Development (RID) Projects; and Organizational Development (OD) initiatives performed through Strategic Transformation and Change Projects.

INTRODUCTION

Knowledge Management (KM) is focussed on the following highly important strategic objectives:

- Creating knowledge and utilizing Knowledge Management as a strategic initiative.
- Applying innovation for achieving more effective ways of operating.
- Applying information-rich knowledge re-use for promoting organizational effectiveness & efficiency (productivity).

Digitalization is essentially an innovation issue and organizations are approaching it with the usual wide variety of attitudes, methods and expectations encountered in managing innovation and change. The attitudes depend largely on the organization's digital maturity. But innovation and change should rather be explained and motivated by increasing profitability, competitiveness and customer expectations rather than hard

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technologies. Moreover, in Industry 4.0 open innovation business ecosystems the concepts of innovation (technology), knowledge and information become highly integrated in non-bureaucratic organizations utilising virtual networks of partners (VNPs), where key enabling technology management has moved into the strategic domain of virtual dynamic learning organizations (VDLOs).

The Business Dictionary describes enabling technologies as equipment and/or methodology that, alone or in combination with associated technologies, provide the means to generate giant leaps in performance and capabilities of the user. For example, the coming together of information and telecommunication technologies, the internet of things, and groupware has leveled the field so that even smaller firms are able to compete in areas where they otherwise could not. It is not specific technological innovations, but rather the capability to generate a stream of products, services, and process changes that matter for long-term organizational performance.

In the Industry 4.0 economy, dynamic capabilities theory is profoundly important in creating performance-rich virtual dynamic learning organizations (VDLOs) to replace dysfunctional bureaucratic entities. Disruptive key enabling technologies (KETs) play a major role at many organizational levels in this transformation and change. As a result, new challenges and opportunities arise with respect to product, service, process, and organizational design and development. Moreover, dynamic capabilities are seen as an ability to reconfigure, redirect, transform, and appropriately shape and integrate existing core competencies with external resources, and strategic and complementary assets to meet the challenges of a time-pressured, rapidly changing world of competition and imitation.

Dynamic capabilities are not primarily concerned with fixed assets, but rather aim to explain the way firms locate resources for innovation over time, how existing resources are generated and deployed, and where new resources are obtained. This is highly relevant for developing an approach to knowledge- and technology management, since it explains how combinations of resources and processes can be developed, deployed and exploited for all activities in the new economy. Capabilities theory does not take the market or the product as a given, but as objects of strategic reconstruction, emphasising the key role of strategic management in appropriately adapting, integrating and reconfiguring internal and external organizational skills, resources, and functional competencies towards a changing environment. Rigid, inflexible bureaucracies are incapable of achieving this.

The foundation of dynamic capability is for it to be embedded in the values, beliefs and guiding principles constituting the organizational value system, and the organization's leaders, particularly at the executive level, to possess effective role modeling abilities to create paradigms and structures that motivate managers and followers to efficiently achieve strategic benefits. The Value System contains the profoundly important beliefs of trust and openness, as also the total quality management principles of customer focus, innovative continuous improvement, employee empowerment, and knowledge-rich systems thinking, which are all of paramount importance for organizational performance and enhancement in modern open innovation business ecosystems of the new economy (Steyn and Semolic, 2017).

Innovation-, Technology-, and Knowledge Management are profoundly important in the strategic domain of virtual dynamic learning organizations. The four aspects most influenced by the industry 4.0 economy are customer expectations; product, service and process enhancements; collaborative innovation; and organizational forms. All play an important role in transforming from bureaucracy to Virtual Dynamic Learning Organizations where sound knowledge management is of paramount importance. Bearing in mind that disruptive key enabling technologies (KETs) are profoundly responsible for the transformation and change in organizations brought about by these four aspects, the importance of innovation-, technology-, and knowledge management cannot be underestimated.

Moreover, technology management must be seen through the lens of dynamic capabilities theory. Technological changes continuously create new challenges and opportunities in product, service, process, and organizational development. Opportunities need to be captured and converted into value through effective and dynamic innovation-, technology-, and knowledge management, which require new ways of understanding to also capture its dynamic nature and the concomitant managerial aspects (Semolic and Steyn, 2017).

INNOVATION, KNOWLEDGE AND INFORMATION

Introduction

Innovation is a continuous process and has an impact on the effect that learning has on knowledge creation within the organization. New knowledge must firstly be created, and secondly be used by individuals, teams and organizations in order for it to be an innovator factor, innovations that did not have a previous existence within the company. Learning how to innovate effectively entails managing knowledge. Provided it is applied effectively

through sound information flow, innovation leads to positive changes in process efficiency, productivity, product (and service) quality and competitiveness (Semolic and Steyn, 2018).

A preferred organizational culture and mindset assist in translating innovative activity into tangible performance improvements. Organizational learning is an important process for individuals, teams and the organization as a whole to advance innovation skills. The rate of learning determines the rate of competitive advantage, especially in knowledge-intensive entities. Innovation can originate in all areas of the organization and management, and can be knowledge-based, product- and service-based, or process-based.

Organizational innovation involves the implementation of new organizational methods that create value for internal and external stakeholders. Management innovation involves the management of innovation processes relating to an organization's responses to opportunities in using its creativity for introducing new ideas, products (and services) or processes.

Knowledge-based innovation can include assets such as physical embodiment, computerised information, innovative property or even economic competencies, and is dependent on the market or industry in which it operates and competes. Without knowledge and sound information flow, innovation cannot transpire.

Process innovation can be viewed as the introduction of a new or significantly improved method for the production or delivery of output that adds value to the organization. It produces benefits in the production process, generally increasing the productivity and reducing costs.

Product and service innovation consists of changes in product/service attributes and how these changes are perceived by consumers.

Knowledge creation and sharing are essential for innovation, organizational growth and sustainable improved performance (Steyn and Semolic, 2020).

Collaboration, Networks and Learning

The value of collaboration initiates from the sharing of resources, gaining market entry and/or critical mass in a particular marketplace, or enhancing efficiency and effectiveness. That is the reason why organizations in the Industry 4.0 economy seek to create new value by collaborating with other organizations in order to become part of a knowledge network to learn. Collective learning within knowledge-based organizations

occurs within the boundaries of the organization itself in the form of teamwork, or outside the boundaries in the form of networking such as communities of practice (Steyn and Semolic, 2020).

Unlike bureaucracies, Virtual Dynamic Learning Organizations (VDLOs) share knowledge across functional, divisional, regional and cultural borders to improve performance. Moreover, they increase effectiveness and efficiency, by learning from colleagues, virtual partners and customers. In intra-organizational networks, employees share a social and organizational context, establishing informal personal bonds that support the exchange of knowledge. A Community of Practice (COP) is increasingly regarded as an important structure within organizations. The COP network is well suited for the development and sharing of knowledge practices across organizational divisions (Steyn and Semolic, 2016).

Inter-organizational collaboration is vital for growth and competitiveness and can be obtained through knowledge-capturing methods. In the Virtual Dynamic Learning Organization (VDLO) inter-organizational collaboration occur mostly through virtual networks of partner (VNP) teams. Collaboration (see Figure 1) helps organizations (including whole networks of manufacturers, component suppliers and service providers), understand how to create value faster, undertake more agile processes, implement continuous innovation utilising both emerging technologies and new ideas, and to respond to ever-increasing Industry 4.0 customer expectations. To be successful requires “collaboratist” leaders on board who are equipped with collaborative mindsets (Steyn and Semolic, 2017 March).

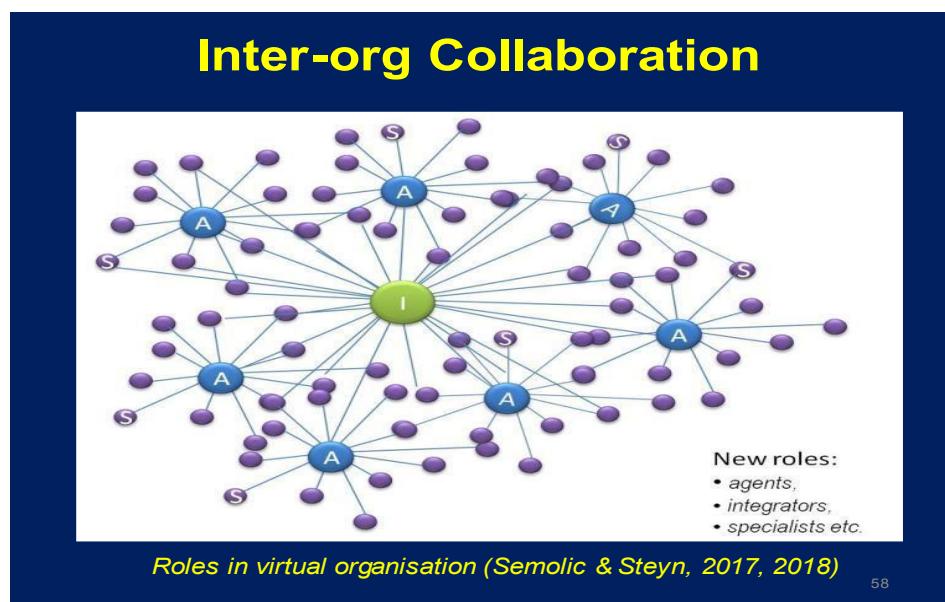


Figure 1: Roles in virtual organizations (Semolic and Steyn, 2017 Sept)

Interdisciplinary heterogeneity in workplaces improves decision-making processes for greater innovations, underpinning the view that knowledge and information creation and sharing are essential for innovation, organizational growth and sustainable improved performance. Initially, understanding how organizations collaborate to become part of a knowledge network helps them to meet the needs of their customers based on a better understanding of their industry and collectively deploying this knowledge. Collective learning, and the nature and purpose of the interactions between network partners facilitate such key learning capabilities, based on how and why organizations interact, which influences what learning is shared, and how such learning is utilised by the entities involved.

As organizations are in a continuous mode of transformation and change in the Industry 4.0 economy they can be viewed as autonomous self-renewing systems, however, this process can only take place when there is interaction between the organization and its environment. Knowledge practitioners and business managers must not only adopt 4IR mindsets and organizational cultures when addressing evolving initiatives, but should understand the workings of organizations as collaborating systems and be equipped to lead and control transformation and change by using suitable strategies in becoming superior competitors themselves (Semolic and Steyn, 2017 Sept).

KNOWLEDGE MANAGEMENT CHARACTERISTICS

Knowledge Management Defined

Defining Knowledge Management incorporates the process for creating, sharing, acquiring, applying, capturing and codifying knowledge, and utilizing the resulting knowledge assets to continuously improve the organization.

“Knowledge management (KM) is defined as the productive creation, assembly and utilization of knowledge assets, with the purpose of enhancing organizational learning, competitiveness and performance”.

It involves systematic coordination and integration of an organization's people, technology, processes and structure with the aim of adding value through re-use and innovation. Coordination and integration of knowledge are achieved and a corporate memory of valuable lessons and best practices learned established as knowledge assets. This fosters continued organizational learning. Knowledge management is a system generating the creation of new knowledge that reaches all employees who have an ability to package knowledge as value-add in products, services and processes. Knowledge management ventures way beyond the storage and replication of information and data (Barac, 2015).

Knowledge-Based Organizations

Leadership can be described as having a strategy focus on the one hand, and a people focus on the other hand. Having a strategy focus is about positioning the organisation in the market environment to ensure that benefits of strategic importance are realised. Building on the strengths of human capital means having a solid understanding of people and their relationships, bolstering their careers based on the cognitive and conative talents they possess. In new economy Virtual Dynamic Learning Organisation (VDLO) the need for creativity and innovation leading to superior knowledge and learning impacts positively on organizational competitiveness and performance.

Industry 4.0 collaboratist leadership establishes the organizational Value System which embeds the organisation's values, beliefs, and guiding principles, and dictates the preferred organisational culture. The guiding principles constitute the TQM philosophy principles aiding operations in all Value Chain processes. Through sound strategy executive leadership ensures that the organization's purpose is comprehensively defined to pave the way for productive knowledge management. Moreover, by putting people first and building on their strengths they ensure continuous enhancement of human resource knowledge and skills that culminate in creativity and innovation (Steyn and Semolic, 2017 March).

Knowledge-based organizations rely on the pillars of Purpose, Perspective, Place and Process (adapted from Barac, 2015).

- **Purpose** relates to the organization's mission and strategy, and how it intends serving its clients. Knowledge-based organizations recognise knowledge as a profoundly important strategic resource to be continuously supported by means of effective and efficient knowledge management.
- **Perspective** relates to the organization's preferred culture and mindset, and its attitude toward knowledge. For success, VDLO cultures and mindsets must replace bureaucracy. Successful knowledge-based organizations mobilise knowledge with respect to all aspects of business and administration, ensuring continuous learning and enhancement.
- **Place** represents boundaries wherein knowledge is shared or created in the organization. New economy VDLO boundaries span beyond the organization into the collaborative business ecosystem through virtual networks of partners and knowledge workers. Hence, the knowledge-based organization is a collection of teams and partners resources creating, sharing and applying knowledge through a continuous process of collaboration.

- **Process** involves knowledge creation and sharing, which include internal organizational activities mostly directly connected with manufacturing and marketing a product or service. Management's focus is on two interconnected processes, effective application of existing knowledge, and creation of new knowledge. These support the primary activities and ensure that information and knowledge flowing from any organizational department are available to others, offering opportunities and incentives for experimentation and learning.

Barac (2015) avers that active drivers for the use of knowledge are “people, practices and processes. Resources associated with “people drivers” encompass people, technology, information, finance, time, etc. Organizational structure associated with “practices drivers” encompass practices, forms, skills, capabilities, capacity, strategy, policy, etc. Processes associated with “processes drivers” encompass supply chain operations, project portfolios, quality management systems, etc., as shown in Figure 2.

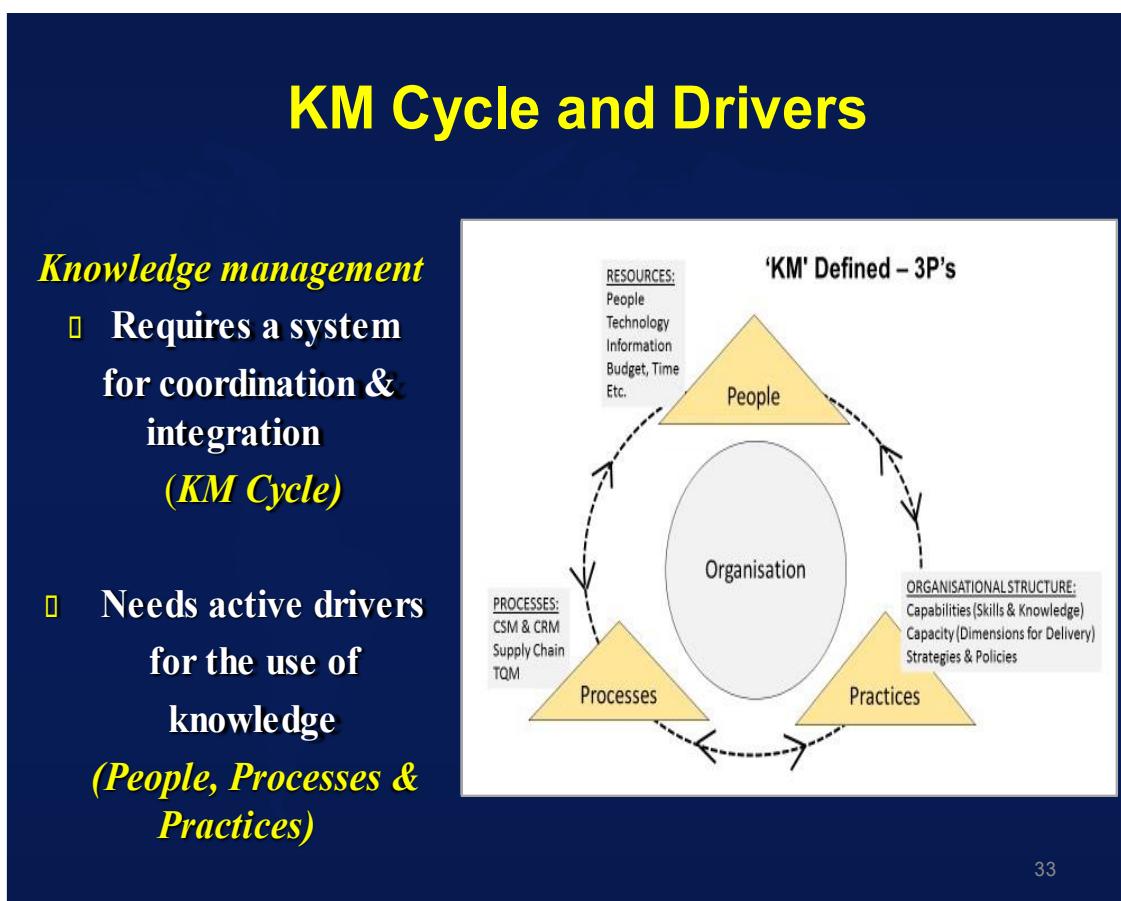


Figure 2: Knowledge Management Cycle and Drivers (Barac, 2015)

The Knowledge Management Cycle (KM Cycle)

Coordination and integration of an organization's people, technology, processes and structure are achieved through a knowledge management cycle (KM Cycle) of create, share, acquire, apply, capture and codify proposed by Dalkir (2005), illustrated in Figure 3. Create is a major stage of the KM Cycle and its integrated relationship with innovation and key enabling technologies (KETs) is of paramount importance. The KM Cycle is an iterative process where knowledge is constantly generated and renewed to enhance organizational learning and performance. Moreover, its strategies impact directly and indirectly on innovation and innovative capability.

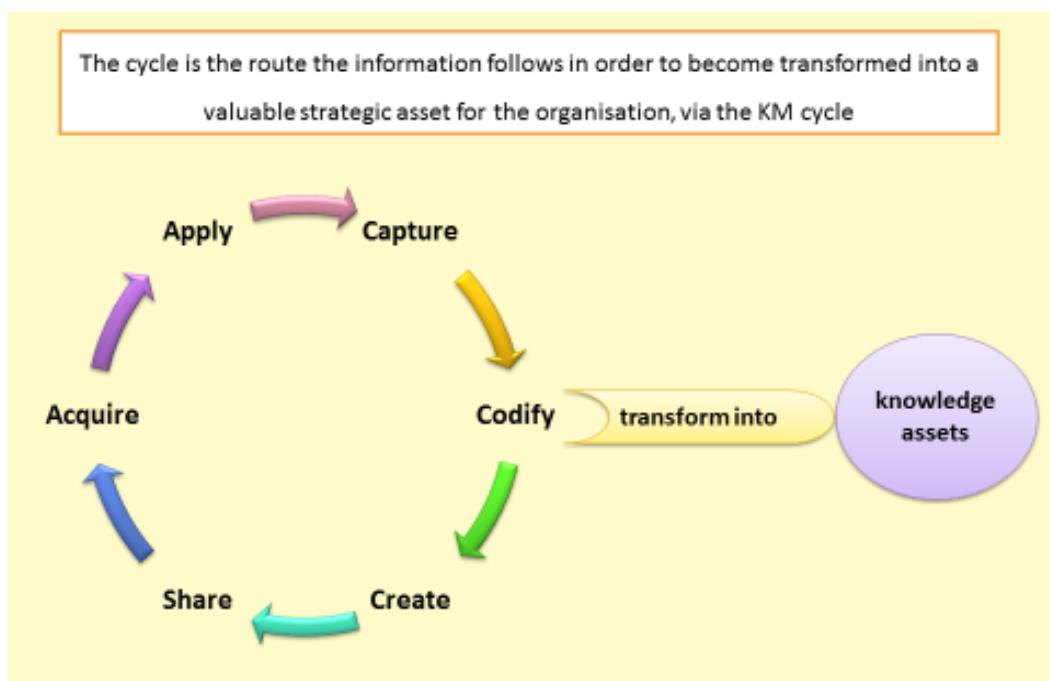


Figure 3: The Integrated Knowledge Management (KM) Cycle (Dalkir, 2005)

The above renders the Virtual Dynamic Learning Organization (VDLO) the ideal vehicle for superior Knowledge Management, which endeavours to maximise knowledge-related value for individuals and organizations alike. Knowledge management as a primary enabler of organizational performance is reliant on intellectual capital. Moreover, the focus of management should be centred around assisting workers in performing their daily jobs better, and motivating them to be aligned with organizational strategy. It is their duty to ensure that all organizational support systems are people-focused and people-friendly.

Knowledge Creation

The ideal vehicle for KM Cycle application is the Virtual Dynamic Learning Organization (VDLO). This is particularly true for Knowledge Creation involving the development of new knowledge and know-how leading to innovations. Knowledge creation occurs, *inter-alia*, through (Steyn and Semolic, 2022):

- **Innovations** by research and development teams (project teams), as also, individuals endeavoring to improve the way they perform their tasks.
- **Experimentation** and **reasoning** with existing knowledge.
- **Hiring** of new people, **transferring** of people between departments, and knowledge **importing** (knowledge from experts, procedure manuals, and engaging in joint ventures).
- **Observing** the real world (site visits, observing processes, etc).

Major sources of knowledge creation utilizing project initiatives are:

- **Research and Innovation Development (RID) Projects** (Semolic and Steyn, 2018).
- **Organizational Development (OD) Initiatives** performed through strategic transformation and change **projects** (Steyn and Semolic, 2017 September).
- **Innovative Continuous Improvement Projects** resulting from systems thinking initiatives emanating from a formal **Quality Management System (QMS)** (Steyn and Schmikl, 2022).

The above sources of knowledge creation will be expanded upon in a paragraph to follow.

KNOWLEDGE MANAGEMENT AS CATALYST FOR ORGANIZATIONAL PERFORMANCE

Enacting Knowledge Assets to Create Value Capacity

Carlucci, et al, (2004) opine that the ability of an organization to govern knowledge assets dynamics lies at the core of its value creation capacity. Knowledge Value Chains represent the flow of knowledge through a sequence of processes in which its value is increased at each stage. Key Performance relates to the entity's strategy whereby

leaders and managers must design a set of specific performance objectives for each defined dimension of performance. According to Steyn and Schmikl (2022), the strategic dimensions of performance are behavioural, structural and operational as shown in Figure 4.

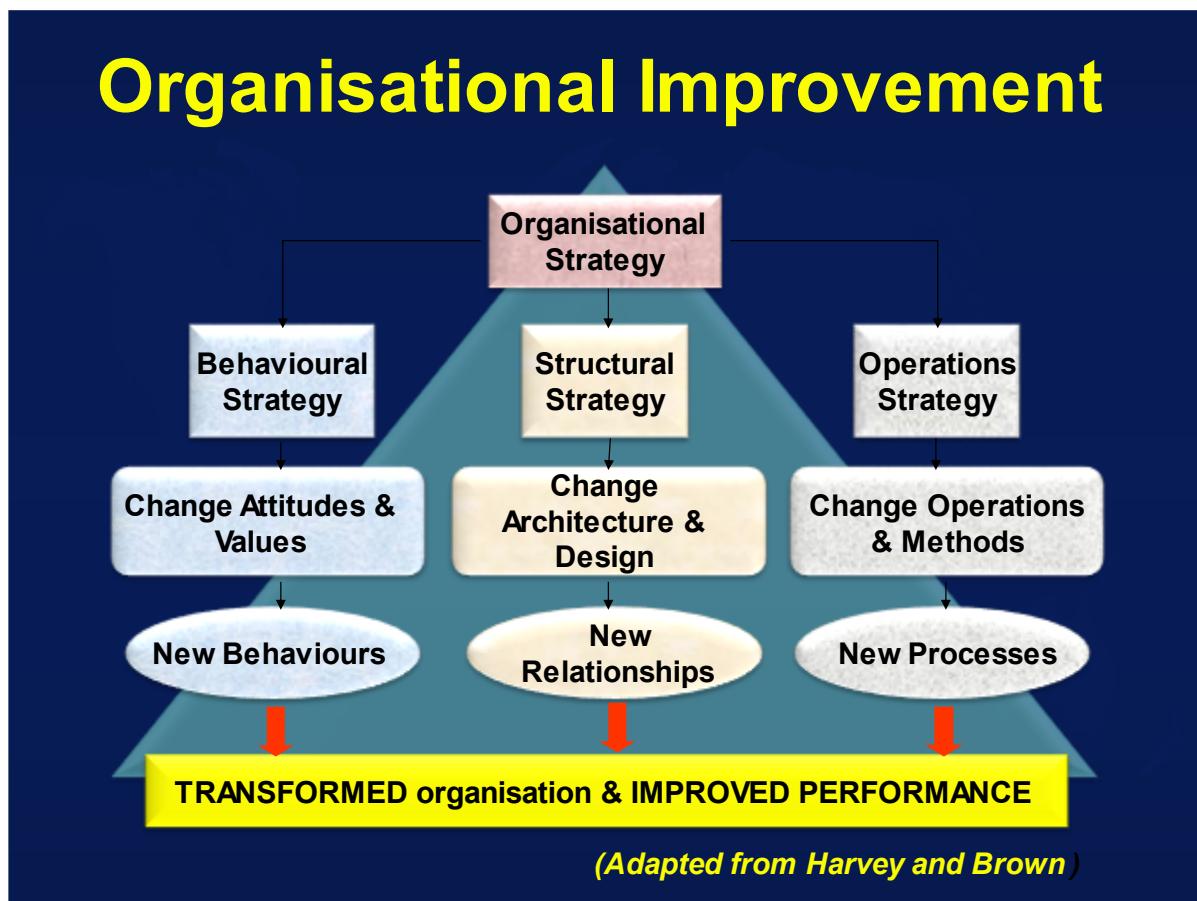


Figure 4: Strategies to Manage Innovation, Transformation and Performance
(Steyn & Schmikl, 2022)

Entities displaying superior knowledge are able to coordinate and combine their traditional resources and capabilities in new and distinctive ways, providing more value for their customers than can their competitors. By having superior intellectual resources an organization understands how to exploit and develop its traditional resources better than competitors, even if some or all of those traditional resources are not unique. Smart entities achieve the above-mentioned by replacing bureaucracy with Virtual Dynamic Learning Organization (VDLO) structures and paradigms.

The VDLO as Key Knowledge Assets Value Driver

Identification of Key Knowledge Assets Value Drivers include strategic and managerial perspectives with respect to the identification of the most important knowledge resources, or the Key Knowledge Assets Value Driver required to achieve the performance objectives. Steyn (2003) proposed the Balanced-Scorecard Programme Management (BSPM) System which forms the basis of the Virtual Dynamic Learning Organization (VDLO). The Virtual Dynamic Learning Organization with its refined culture, structure, and dynamic capabilities constitutes an important new economy Key Knowledge Assets Value Driver.

In subsequent publications, Steyn (2010, July), and Steyn and Semolic (2016), the role of Chief Portfolio Officer (CPO) in charge of the cross-functional VDLO supply chain and project portfolios was advocated. Moreover, Steyn and Semolic (2019) present a detailed discussion of project and programme management acumen as a catalyst for Industry 4.0 organizational success. It is the responsibility of leaders and managers to implement dynamic capabilities for growing, maintaining, and sustaining the Key Knowledge Assets Value Drivers. This is achieved through a Quality Management System (QMS) as an integral part of the Virtual Dynamic Learning Organization (VDLO). The Quality Management System (QMS) measures performance on a continuous basis utilizing the balanced scorecard. The VDLO value chain schematic is illustrated in Figures 5.

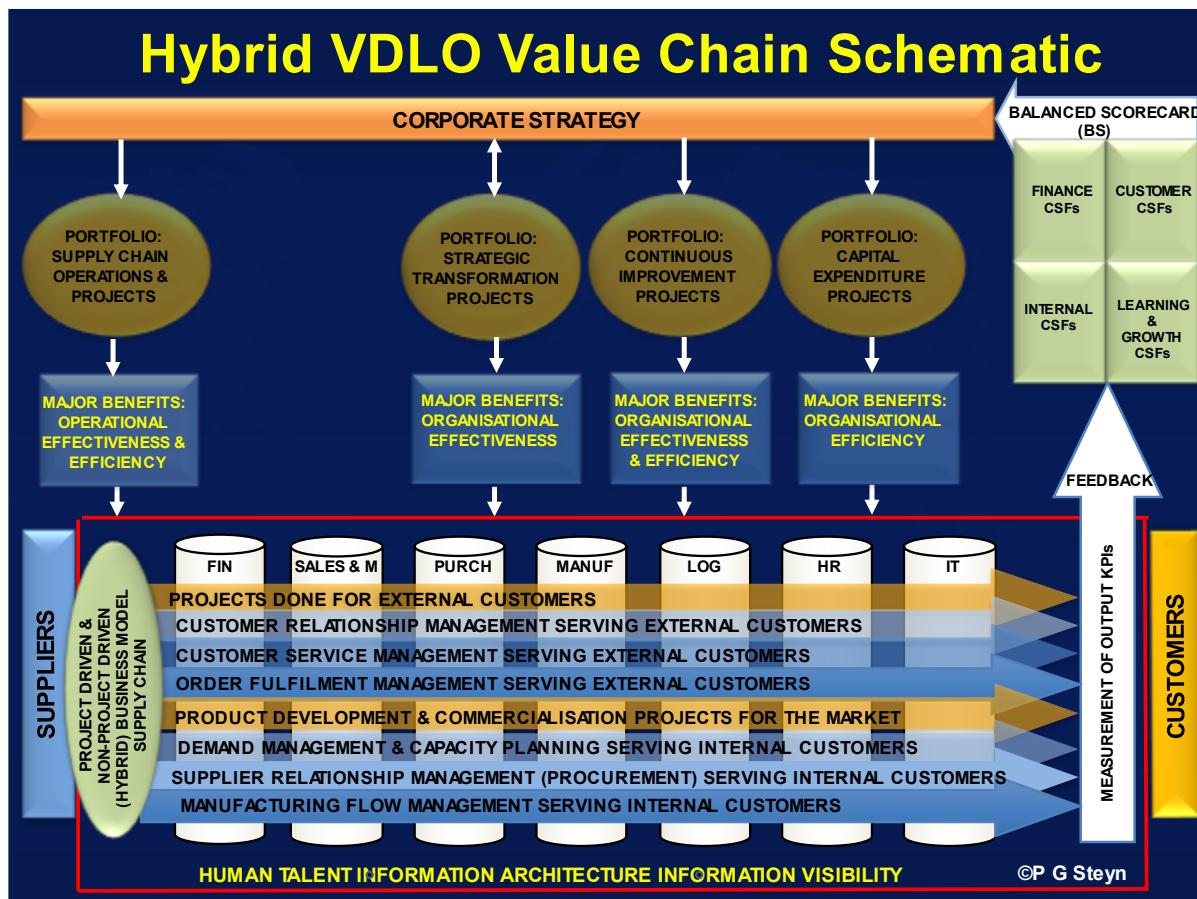


Figure 5: The Hybrid Business Model VDLO as Key Knowledge Assets Value Driver
(Pieter Steyn, 2003)

Entities adopting VDLO structures and paradigms become highly successful by mobilising and aligning their intangible assets supporting the organization's value proposition with corporate strategy. In this way they maintain and refresh core competencies for continuous product, service, and process innovation. Value creation can only be sustainable when core competencies, which are the underpinnings of the customer value proposition, are developed, but most importantly, aligned with strategy, and well measured and managed (Steyn and Semolic, 2020).

In the new economy, it is imperative that entities innovate to create new products, services, and processes in order to sustain competitive advantage. In the absence of innovation an organization's value proposition will eventually be imitated, thus eroding competitive advantage. Moreover, in order to innovate and create new value, employees must be equipped with knowledge-rich learning and provided with sound information.

Competitive advantage emanates from the ownership of knowledge assets and it is consequently vital for leadership and managers to identify their knowledge assets and have the ability to leverage them. Understanding these principles enable organizations to rapidly transform from bureaucracies to Virtual Dynamic Learning Organizations (VDLOs), allowing their knowledge assets to continually develop and enhance performance (Steyn and Semolic, 2020).

Rigid functional approaches to management can no longer cope with the demands of the new economy. Moreover, communication in traditional bureaucratic organization forms is much too cumbersome, impeding the flow of information, innovation and managerial decision-making. Management in these organizations tends to lack both strategic purpose and customer focus and is in desperate need of transformation and change through organizational development and systems thinking.

For project- and programme management this became a real challenge, since most of what had been assumed in the past no longer befit current reality, motivating the creation of Virtual Dynamic Learning Organizations (VDLOs). They are highly conducive to information- and knowledge flow, making them ideal vehicles for driving value-delivering Knowledge Assets.

An example of the VDLO as a Key Knowledge Assets Driver is discussed in Steyn and Steyn (2022). The article entitled: “Addressing the Dearth of Management Science in the Covid-19 Pandemic”, proposes a Strategic Policy Advisory (SPA) entity structured as a cross-functional VDLO. The VDLO as Key Knowledge Assets Value Driver strongly supports the KM Cycle stages of Create, Share, Acquire, Apply, Capture and Codify associated with Knowledge Management.

As alluded to earlier, major sources of Knowledge Creation in the new economy are development and improvement project initiatives undertaken by VDLOs (see Figures 5 and 6):

➤ **Research and Innovation Development (RID) Projects**

The unit engaged in RID projects is located in the VDLO cross-functional Supply Chain illustrated in Figure 5. All project initiatives are developmental, involve high levels of virtual networks of partner utilization and are profoundly valuable sources of knowledge creation. The above-mentioned article by Steyn and Steyn (2022) also proposes and provides an example of how pharmaceutical organizations’ cross-functional RID project processes should be structured.

➤ **Organizational Development (OD) Projects**

This VDLO project portfolio is illustrated in Figures 5 and 6. All project initiatives are developmental in character and relate to strategic organizational transformation and change actions being implemented. The initiatives involve high levels of knowledge worker utilization and are profoundly valuable sources of knowledge creation.

➤ **Innovative Continuous Improvement Projects**

This VDLO project portfolio is also illustrated in Figures 5 and 6. These result from systems thinking initiatives emanating from a formal Quality Management System (QMS). The QMS is illustrated in Figure 7. The Innovative Continuous Improvement Portfolio is likewise a profoundly valuable source of knowledge creation.

Additional knowledge creation sources of importance found in VDLOs are the following project and operational initiatives mostly located in its cross-functional Supply Chain:

➤ **Capital Expenditure Project Portfolio**

This VDLO project portfolio is located outside the Supply Chain as illustrated in Figures 5 and 6. These projects result from infrastructural-related initiatives.

➤ **External Customer Projects**

The project office engaged in doing projects for external customers is located in the VDLO cross-functional Supply Chain as illustrated in Figure 5. These project initiatives result from tenders won in a bidding process. This project office only exists in organizations that operate on a project-driven business model.

➤ **Customer Relations Management, Customer Service Management, and Order Fulfillment Processes**

The above processes are located in the VDLO cross-functional Supply Chain illustrated in Figure 5. They serve external customers and are highly important knowledge-creation sources for customer value purposes. The Order Fulfillment process only exists in organizations that operate on a non-project-driven or hybrid business model.

➤ **Demand Management and Capacity Planning-, Procurement-, and Manufacturing Flow Management Processes**

The above processes are located in the VDLO cross-functional Supply Chain illustrated in Figure 5. They serve internal customers and are highly important knowledge-creation sources for capacity value purposes. These cross-functional processes exist in organizations operating on any business model, or a combination thereof, of choice.

All the above cross-functional Supply Chain processes are easily measured and appraised via the Quality Management System (QMS) incorporated in the Virtual Dynamic Learning Organization (VDLO) constituting the Key Knowledge Assets Value Driver. Knowledge of mostly a tacit kind is also created in the functional departments of the organization providing resources to the Supply Chain and Project Portfolios.

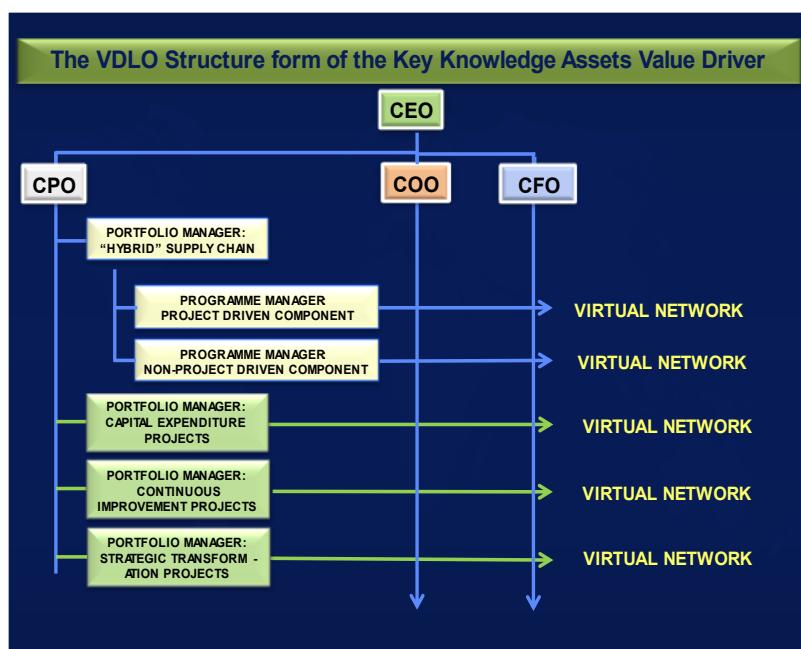


Figure 6: The VDLO 'Key Knowledge Assets Value Driver' Structure Form

Steyn (2010, June), and Steyn & Semolic (2018, May) purport that central to the VDLO approach was creating high-performance integrated process and project teams operating in an integrated, coordinated and collaborative manner across functional and organizational boundaries. Specialist outsourced teams, shaped as virtual networks of partner (VNP) organizations enhancing the organization's capacity, are integrated into organization-wide high-performance process and project teams.

The actions and performance of the horizontally organised teams are coordinated by portfolio-, programme-, project- and process managers, who maintain a continuous focus on customer needs, irrespective of whether it is an external or internal customer. Moreover, the portfolio-, programme-, project-, and process managers operating in the VDLO value chain ensure that the goals and objectives of all deliverables are aligned with the strategic objectives of the organization. These actions strongly promote effective and efficient Knowledge Management.

A sound value system leads to leadership role modeling excellence. Competitive excellence results from this, and a strong focus on customers' needs and wants emerges. A sound value system serves as a strong foundation for the development of an organization's Quality Management System (QMS) as illustrated in Figure 7. It is clear that the value system, which embeds the guiding principles of TQM philosophy, plays a fundamental role in innovative enhancement initiatives and Knowledge Management.

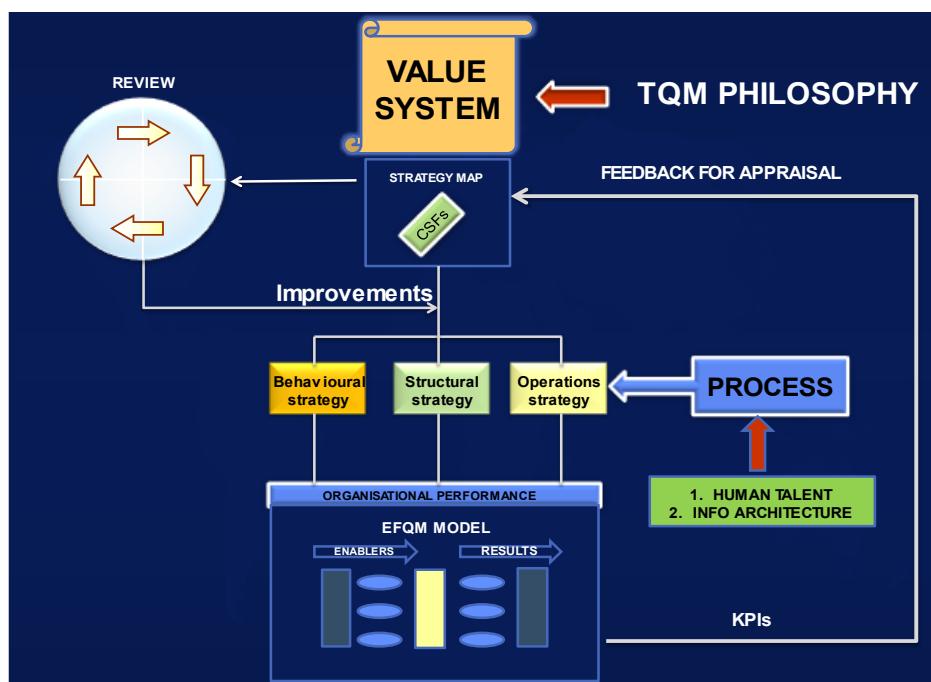


Figure 7: The Quality Management System (QMS) (Steyn and Schmiki, 2022)

The Quality Management System (QMS) clearly demonstrates how innovative enhancement initiatives originate, and further illustrates the important roles played by the following components of the QMS:

- The organizational **Value System** embedding the **TQM Philosophy**.
- The **balance scorecard** in its **strategy map** form defines the

organization's **mission** in strategic themes.

- The **Plan, Do, Check, Act (PDCA) cycle** for **continuous improvement** (for review) was proposed by Dr Edward Deming, the top guru of total quality management (Figure 8).

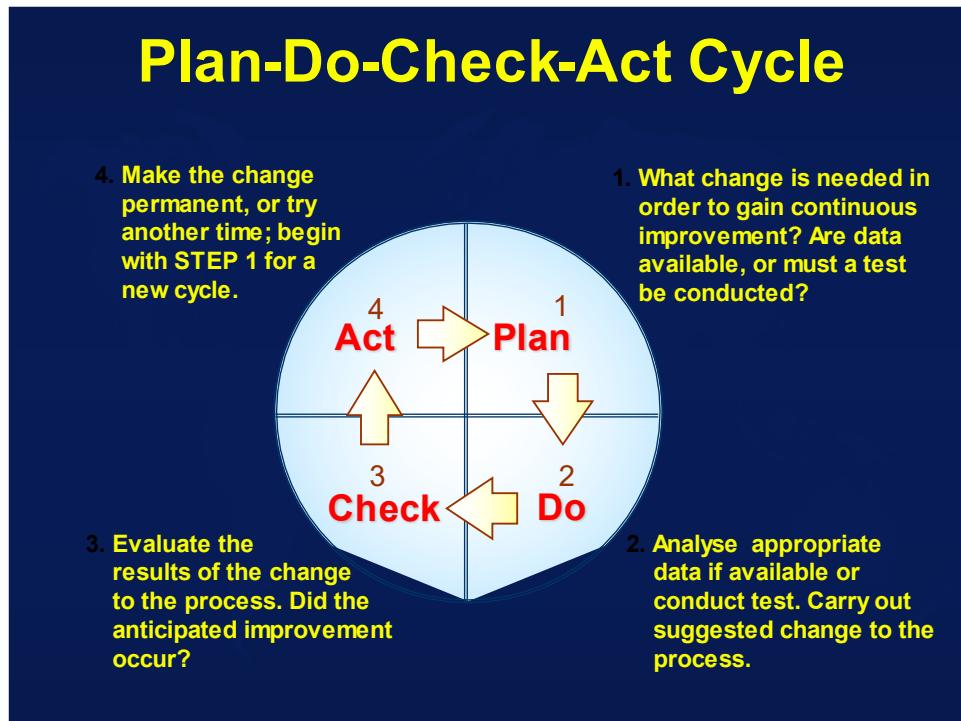


Figure 8: Deming's Plan, Do, Check, Act Cycle

- The adapted Harvey and Brown **Organizational Performance and Improvement** model focusing on **behavioural, structural, and operations** strategic dimensions shown in Figure 4 (Steyn and Schmikl, 2022).
- The **European Forum for Quality Management (EFQM)** excellence model with its enablers, results, and feedback delivering critical dynamic capabilities of innovation and learning (Figure 9).

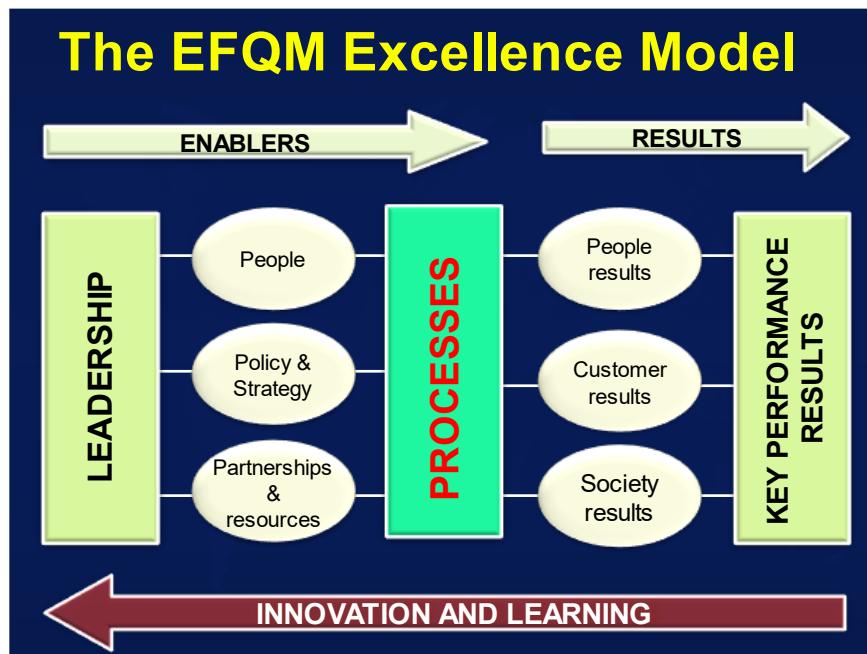


Figure 9: EFQM Excellence Model

CONCLUDING REMARKS

Organizational forms are an aspect highly influenced by the Industry 4.0 economy, and how organizations handle knowledge integration through organizational design is of paramount importance. An increase in knowledge application personalises future interaction and facilitates collaboration in virtual networks of partners (VNPs). It supports ongoing dialogue with customers and minimises wasted time spent by partner entities and knowledge workers seeking information, allowing more time for sharing knowledge, leveraging organizational learning, as also, customer service- and relationship management (CSM and CRM).

The Virtual Dynamic Learning Organization (VDLO), which involves virtual networks of partners (VNPs), is a profoundly effective and efficient value chain system and Key Knowledge Assets Value Driver. Inter-organizational relationships provide two distinct potential benefits: short-term operational efficiency and longer-term new knowledge creation. The need for continual value innovation is driving value chains, including the supply chain, to evolve from a pure transactional focus to leveraging inter-organizational partnerships for sharing information and, ultimately, market knowledge creation.

VDLOs embed highly important Development & Improvement Project initiatives constituting profoundly important 4IR sources of Knowledge Creation. VDLO Value

Chains also embed Knowledge Creation project initiatives such as the Capital Expenditure Portfolio, and Supply Chain located projects done for external customers. Moreover, customer-focussed Supply Chain processes such as CRM; CSM; and Order Fulfillment, as also, capacity-focussed Supply Chain processes such as Demand Management & Capacity Planning; Procurement; and Manufacturing Flow Management perform knowledge-creating operations.

Value chain partners are engaging in interlinked processes that enable rich (broad-ranging, high-quality, and privileged) information sharing, and building information technology infrastructures. This allows them to process information obtained from partners in the network to create new knowledge and enhance organizational knowledge management. The VDLO as Key Knowledge Assets Value Driver strongly supports knowledge-enabled customer value. It constitutes a valuable practice for channeling relationships to deliver excellent service to customers, and maximise customer retention, loyalty and revenue.

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